STUDY OF THE EXTENSION OF PLANT PROTECTION MEASURES IN AGRICULTURAL PRODUCTION

Programme Evaluation Organisation
Planning Commission
Government of India
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CHAPTER I

Objective and Methodology of the Study :

1.1 During the last fifteen years or so, chemical measures to control pests, diseases and weeds have progressively gained in popularity although they are far from the required scale of adoption. The plant protection measures can be broadly classified into four groups :

(i) Chemical control;

(ii) Mechanical and Physical control;

(iii) Cultural control;

(iv) Biological control;

(i) *Chemical control :*

The most popular plant protection measure at present is that of chemical control. This method involves spraying and dusting of plants with chemicals and poisons or mixing these into soils to kill the pests and diseases, which inhabit the soil.

(ii) *Mechanical and Physical control :*

Mechanical control involves eradication of the field rats mechanically, scaring away birds, monkeys and other animals, collection of egg masses of insects and pests etc. Physical control measures include the application of heat or radiation, e.g. sun treatment of seed. These methods primarily involve application of labour and can be applied on a large scale.

(iii) *Cultural control :*

There is a lot of scope for popularising cultural control measures, as they are simple and easily understandable, such as proper rotation of crops, spacing of plants, ploughing and irrigating land at appropriate time etc. It is estimated that weeds alone damage as much as 30% of certain crops. Such losses can be avoided by adopting cultural control measures.

(iv) *Biological control :*

This method consists of control of pests by introducing their natural enemies like parasites and predators. This method involves considerable research and the present stage in this regard is one of trial and experimentation on a selective basis both in respect of crops as well as areas. Plant protection organisations at the Centre and in the States are also concerned with internal and external quarantine.

1.2 Real hope for reducing losses from plant diseases and pests to the minimum possible level lies in the sphere of plant protection measures which need to be taken at the level of the farmer. Effort at this level has certain implications. Firstly, many of the measures lose their value unless adopted on a community basis, e.g., rat control, weed control, application of pesticides etc. If some of the farmers do not adopt a measure, they reduce the

effectiveness of the efforts of others. Secondly, these measures have to be adopted on a continuing basis to ensure benefits once realised. Thirdly, operation at the level of the farmer implies organisation of supplies and extension effort on a very large scale. This is a programme which has not been studied particularly from the extension angle. It is in this background the P.E.O. decided to carry out a comprehensive study of extension of plant protection measures.

Objective and scope of the study :

1.3 The objectives of the study of the Extension of Plant Protection Measures were : (i) to analyse reasons for the slow progress made by the programme of plant protection measures; (ii) to assess in the context of the Third Plan, the factors and facilities available and needed in respect of organisational arrangements, supplies and extension measures for achieving the Plan target; and (iii) generally to investigate how and to what extent plant protection measures have been taken up by cultivators, individually and collectively, as one of their improved agricultural practices.

1.4 The required information was collected through structured schedules, questionnaires and observational reports at different levels from the State, district and block levels. Specific data were collected on the plant protection measures undertaken in the last 10 years under the Pests and Diseases Act in different States. At the district and block levels, data on expenditure and achievements during Plan periods, working programme evolved for fulfilling the targets of the Third Plan, etc. were also collected. The main focus of the study at the village and respondents' levels was on (a) the State of knowledge among the selected respondents about the recommended plant protection measures against the pests and diseases; (b) the extent of adoption of the various measures and the technical guidance received by them for identifying and treating the pests/diseases at the time of occurrence; (c) the agencies responsible for the supply of materials and equipment; and (d) the ascertaining of the views of the respondent cultivators regarding the adequacy of extension efforts, supplies, facilities, etc.

1.5 The comprehensive data, qualitative as well as quantitative, collected along the lines indicated above, are analysed in the different chapters to follow. It may, however, be noted that the production of various types of chemicals and pesticides as well as the manufacture of different types of plant protection equipment are largely in the private industrial sector. Such aspects relating to the production of these materials were outside the scope of this study.

Methodology of field investigation :

1.6 The study was conducted, commencing from the State down to the cultivator-household level. At the levels of State and district, relevant information for the study was collected from the Department of Agriculture, through schedules and guide-points. The Regional Evaluation Officers and the Project Evaluation Officers met the concerned agencies several times in the course of the field investigations and collected such data through discussions, official records etc. Similar method was adopted for obtaining relevant data at the Block and village levels. At the household level a comprehensive schedule was canvassed to each cultivator respondent by interview method. Qualified and experienced field Economic Investigators under the overall supervision of the P.E.O. and R.E.O. carried out this

crucial part of the investigation. Besides field officers located in the States, the Project Director and other senior officers of the headquarters visited the various selected districts, blocks and villages and supervised the collection of reliable data during the different phases of the enquiry.

Design of the study :

1.7 The study was conducted in 15 States and in Himachal Pradesh. In each State, two to three districts were selected, one of which was an intensive agricultural programme district (package). Out of the other districts in the States, one or the other district having more than the average irrigated area but having low average yield of principal crop among all such districts, were selected. The I.A.D.P. districts are, generally speaking, favourably situated in respect of irrigation facilities, yield of important crops, the use of fertilisers, and plant protection chemicals and equipment. A concentrated effort is made in these to step up agricultural production and all agricultural programmes particularly P. P. measures have been taken up on an intensive scale. The additional district or districts in each State was/were selected from the remaining districts in the States or from the districts in each broadly known region of the State, on the basis of irrigation, average yield of principal irrigated crop or of paddy, if it is the important crop, and distribution of fertilisers per 1,000 acres of irrigated area or per thousand of paddy area. For instance, in Andhra Pradesh there are three broad regions, namely, Coastal, Rayalseema and Telangana. Since the package district belongs to coastal region, the two non-package districts were selected, one from each of the other two regions on the basis of the above criteria. Thus in each State two or more districts were selected, one was the package and the others where the irrigation facilities were more than the average in the State, but the yield of the principal crop was lower as also the distribution of fertilisers. Going by the criterion of irrigation, this is probably the district where there is considerable potential for extending the fertiliser use, adoption of plant protection measures, and for also enhancing per acre yield of the crop.

1.8 In each district two blocks were selected for further investigation. The procedure for the selection of blocks was the same as that for the district with the exception that the Blocks started after 1st April, 1960 were not considered for selection. Thus the blocks with lower than the average irrigated area in the districts as well as blocks started after 1st April, 1960 were excluded from the frame of selection of Blocks. From the remaining blocks, two were selected—one with the highest consumption of fertilisers per thousand acres of irrigated area and the other with the lowest consumption of fertilisers. In working out the consumption of fertilisers in the Blocks, only the irrigated area was taken into account and the areas under different crops were reduced to a common denominator on the recommended doses of fertilisers for different crops. For instance, if sugarcane crop is recommended four times the fertiliser dose compared to the wheat crop, one acre of the sugarcane was reckoned as four acres of wheat for such calculations. The purposive selection of districts and blocks has been directed mainly for a study of the problems, etc. for the use of fertilisers (another evaluation study taken by the Organisation). This selection was found to be equally good for conducting the study of Plant Protection measures as the criteria were mainly related to intensity of cultivation relevant for Plant Protection also.

1.9 In each of the selected blocks, five villages were selected for detailed investigations. One of these was the headquarter village of the V. L. W. The criteria adopted for selection of villages were as follows. In the Blocks of the package programme districts, the village not included in or selected for coverage of the programme and those that were classified as urban places, as per Census, 1961, (or 1951 census) were excluded from the list of villages included in the frame. In the old package districts in the sample (West Godavari, Shahbad, Ludhiana, Aligarh, Pali, Raipur and Tanjore) villages covered by the programme in 1962-63 were excluded, as the villages covered earlier were considered of an adequate size for purposes of our sampling. In some of the new package programme districts where the programme had not been in full swing, the villages proposed to be covered by the programme formed the frame as they had some advantages in respect of extension of package programme.

1.10 In the non-package districts, all the villages in the selected blocks were listed out and from the list those villages which were uninhabited, villages with less than 300 population, villages with proportion of irrigated area to net sown area lower than that of the district as a whole and villages which were urban places as defined in 1961—census, (or 1951 census), were eliminated. In certain cases, the criterion relating to irrigation was substituted by the principle of proportion of paddy area to the gross cropped area. The remaining villages in each Block were grouped into two categories, viz., (a) the VLW headquarter villages and (b) others, and were arranged in the descending order of the proportion of irrigated area to net sown area.

1.11 Only those villages which had been the present headquarters of a V.L.W. for at least one year were considered for inclusion in the list of V.L.W. headquarter villages. From the list so prepared the village with the highest proportion of irrigated area to net sown area was selected for this study. In the case of other villages, the frame was divided into three equal strata and four villages were selected, one from stratum 1 (the V.L.W. headquarter village was also to be from this section), one from stratum 2 and two from stratum 3. Thus 375 villages were selected for detailed investigation on the above criteria.

1.12 A list of all cultivator households in the selected villages was prepared in a proforma designed for the same. From this list, all those households having an area of one-half acre or below of cultivated holdings were excluded. The remaining households were than arranged in the descending order of their operational holdings. The lists so rearranged were divided into five sections and two cultivators from each section were selected at random. Thus, 10 households were selected per village on the above method for canvassing of household schedule/questionnaire for individual respondents. The total number of households thus canvassed was 3,749 of whom 3,084 were owner cultivators, 320 tenant cultivators and 345 others who had also some cultivation holdings.

Historical background :

1.13 Plant protection on the modern lines was introduced in India in early forties. Initially the Entomology and the Plant Pathology Sections in the Agricultural Institutes of the then Provinces used to demonstrate the effectiveness of various measures recommended by these sections. It was slightly later that separate organisations were set up in the Provinces

and the Centre to propagate the adoption of different plant protection measures. In the area under the Princely States, barring a few exceptions here and there, the Department of Agriculture and for that matter the plant protection machinery existed only in name.

1.14 It is only after 1947 and particularly since development planning started in India that the Department of Agriculture has been strengthened on an ambitious scale and in an organised manner. As a part of this process, the plant protection machinery also got strengthened. Staff at the State level, dealing exclusively with plant protection, increased and also improved qualitatively. Staff has been posted at divisional and district levels and in some States at levels intermediate between the district and the block. Training in plant protection has been given to the village level workers who are required to extend knowledge and the adoption of improved practices at the village level.

1.15 By the end of the Second Plan, 365 agricultural graduates were concerned exclusively with plant protection—65 officers and 300 Assistants. As against this, 680 were in position in 1963-64. This indicates considerable improvement in the organisational structure for plant protection. Two important developments during the Third Plan on the organisational side deserve mention. Firstly, in the package areas, much greater emphasis was laid on plant protection than in the other blocks. Extra staff was specially provided for the purpose. Secondly, the Panchayats and the Cooperatives have been assigned an important role in pushing forward the plant protection programmes.

1.16 In view of the above mentioned developments, the present study of the PEO had as its focus, among other things, the impact of the strengthening of staff on the adoption of Plant Protection measures over the years, the relative success of Plant Protection measures in package vis-a-vis non-package areas and the support provided by the local institutions in the implementation of these programmes.

Progress during the Plan periods :

1.17 Chemical plant protection measures covered about 6.0 million acres of cropped area in 1955-56 and 16.0 million acres in 1960-61. The target for the Third Plan was 50 million acres but it was expected that about 40 million acres would be covered. The consumption of pesticides also indicated good progress. The consumption of pesticides at the beginning of the Second Plan was put at 9,445 tons valued at Rs. 1.35 crores and it increased to 37,000 tons valued at Rs. 4.6 crores at the beginning of the Third Plan. In 1962, pesticides were produced to the extent of about 46,000 tons valued at about Rs. 7.5 crores.

1.18 Regulatory measures have been successful in the sphere of the foreign import quarantine although internal quarantine has been weak. Necessary legal powers were bestowed on the State Governments to fight epidemics. In the field of biological control measures, some efforts were made to fight certain pests of arecanut, cotton, sugarcane, apple etc. during the Second and Third Plan but it was just a beginning in this direction.

1.19 In the first two Plans, subsidy on the sale of pesticides and manually operated equipment was given only for treating food crops. In the Third Plan, subsidy was extended to the treatment of all crops. Parti-

cularly on cotton and groundnut, aerial operations with Government or private aircraft were heavily subsidised during the years 1962 and 1963. About 48,000 acres of cotton and 41,000 acres of groundnut were so treated. An indication of the progress of plant protection measures could also be had from the expenditure on these schemes. The actual expenditure on these schemes during the First and Second Plans was Rs. 4.91 crores. The total provision for the Third Plan was Rs. 1,023 lakhs and expected expenditure in the first two years was about Rs. 327 lakhs. These figures, however, did not depict correct picture as the committed expenditure on staff etc. is not included in them. Moreover, expenditure on locust control operations in the years 1959-60 to 1962-63 were not included. The amount spent on plantation crops like tea, coffee and rubber and on commercial and cash crops was also not specifically indicated. The appendix tables 1.1 and 1.2 give details, respectively, of physical achievements and financial outlay on plant protection measures in the States during 1961-62. Likewise, the subsequent two tables are presented for the selected districts.

CHAPTER II

State Policy, Planning and Administrative Set-up :

(a) Legislative Provisions and Enactments for the control of Pests and diseases :

2.1 Ten States have got regular Pests and Diseases Act. In majority of these States, the Act was passed during the decade 1950-60. In Andhra Pradesh, before the formation of the State there were two Acts, namely, the Madras Act and the Hyderabad Act. Madras Act was found to be more comprehensive and it was enforced in the whole of the State. In Mysore State also, there were several Acts in force before the formation of the present State. At the time of our study, the Mysore Agricultural and Diseases Bill, 1962 was pending before the legislature for consideration. The remaining two States, namely, West Bengal and Himachal Pradesh did not have any regular enactment to deal with the pests and diseases. In West Bengal, Agricultural Diseases and Pests Order, 1963 has been in force from 2nd January, 1964. It is, however, not comprehensive and a detailed Act is considered necessary to control pests and diseases. In Himachal Pradesh, there is Himachal Pradesh Fruit Nurseries Registration Act, 1956, under which all nurserymen in the area have to get themselves registered and to get their plants, grafts etc. certified by the Horticulture Officer or his representative, as free from any type of disease or pest. But there is no Act in Himachal Pradesh to deal with diseases in the field crops.

2.2 The provisions of the Acts are more or less on the same lines in all the States. These provide for notifying the area in which there is an attack of pests/diseases. The measures to be taken are also specified. Inspecting Officers are appointed to inspect the fields for supervising the effectiveness of measures taken. Defaulting cultivators can be penalised and operation can be undertaken directly by the Government and the cost can be recovered as arrears of land revenue. The penalty can be imprisonment or fine to a prescribed extent. Under the Act, village officials are duty bound to report the appearance of pests/diseases to the higher officers concerned.

2.3 Thus, the enabling legislation exists in most of the States. It has, however, been reported that most of the States have not enforced the Act in spite of outbreak of diseases and pests. For instance, army worm epidemic broke out in the southern districts of Rajasthan twice during the Second Plan. In 1961-62, there was an attack of locusts in almost all the districts of the State. In the package district of Shahabad in Bihar State, an unknown disease affecting paddy crop broke out in 1962-63. But the Act was not invoked to tackle such situations.

2.4 The State Governments now have at their command a widespread network of extension staff. Instead of enforcing the Pests and Diseases Act, they prefer to depend on persuasion and material inducements. For example, pesticides are rushed to the area and supplied at subsidised rates. Equipment is supplied free for use. Where necessary takavi loans are also given. The whole of administrative machinery is pressed into action. It

has been reported in most of the States that the farmers are now quite conscious of the damage done by the pests and diseases and they readily come forward to undertake plant protection measures in times of widespread attacks of pests and diseases.

2.5 There are, however, certain factors that discourage officers from taking recourse to the Act to push up the adoption of plant protection measures. Firstly, these Acts can be used in the case of epidemics and an epidemic has to be declared. It has been reported that the process of declaring an epidemic takes two to three months in certain States (e.g., Punjab). Thereafter, notices have to be served on the individual cultivators and a period within which they should undertake the prescribed measures has also to be specified. Only if a cultivator does not adopt a measure within the specified period the Government machinery can step in and undertake the operations directly. It is too dilatory a procedure. A pest does not wait for these elaborate processes. It appears and spreads all of a sudden and its control needs quick action. The existing legislation, therefore, needs to be reviewed from this angle. It should be so modified (if needed to meet extraordinary situations) as to make it more easily applicable.

2.6 Another important point that deserves consideration is that legislation need not be restricted to epidemics alone. Adoption of adequate prophylactic and curative measures against pests and diseases should be a part of the normal farming operations. It is true that given certain resources the extension agency should adequately popularise these measures and once the cultivators are sure of the benefit, their initial adoption should be expected to mature into a habit over a reasonable period of time. But in view of the fact that in the matter of plant protection the inaction of a few recalcitrant cultivators can reduce or decimate the effectiveness of the effort of a whole lot of cultivators in a village or a group of villages, the legislation to deal with pests and diseases should become much more comprehensive than what it is at present in many States.

Planning process :

2.7 The Plant protection work was in its infancy at the beginning of planning era. The staff either did not exist or was thinly spread, it did not have much of equipment to supply at the time of need, free or on hire to the cultivators. The supplies of pesticides were meagre, and the farmer was very much ignorant of the measures required to be taken to deal with pests and diseases. But with the advent of planning and particularly after C. D. movement, there was greater emphasis on strengthening of the agricultural extension staff, with provision for equipment and pesticides.

2.8 For the Second Plan, there were no targets fixed for P.P. for the Plan period in some of the States, e.g., Assam, Andhra Pradesh, Gujarat and Maharashtra. Annual Plans were prepared at the State level and broken district-wise, block-wise etc. The reasoning given in some States (e.g., Gujarat) to support the policy of not fixing targets was that the distribution of pesticides and equipment depended on the outbreak of pests and diseases which varied from area to area and year to year and that these could not be predicted with any reasonable extent of accuracy. In some other States (e.g. Maharashtra), it was attributed to the Plant Protection work being in a stage of infancy. In such States, programmes were chalked out in very broad terms every year.

2.9 In some other States, targets were fixed for the second Plan e.g., Punjab, West Bengal and Mysore. But these were fixed on very broad lines. In some cases these were in terms of pesticides and equipment to be distributed. In all, these States, annual programmes or five-year Plans, were decided more on the basis of past performance, availability of funds, equipment, pesticides and staff than on the basis of the needs of the area. These were broken up into district and block targets. The funds provided fell far short of the need that detailed planning was not considered worthwhile.

2.10 For the third Plan, practically all the States decided upon covering a certain percentage of the gross cropped area. But except in a few cases, the overall target of coverage of area with plant protection measures was not broken up crop-wise nor was there any indication of the preventive and curative measures. However, certain programmes were by their very nature preventive e.g., rat control, seed treatment.

2.11 In most of the States the exercise in planning was one from above. In U.P., however, an attempt was made to dovetail planning from above with planning from below. In this State, two sets of targets were available at the district level, each coming from a different source. The Third Plan targets regarding seed treatment, deratting and "other plant protection measures", as available at the district headquarters, were built up from lower levels. The Gram Sabha Plans were built up into Block plans and Block plans were consolidated into district plans. At the district level, in a meeting of district officers and non-officials concerned, the district plan was modified and finalised after due deliberations. But there was another set of targets available for each district. It was the target sent down by the Deputy Director (Plant Protection). It was reported that the targets laid down from above were very modest as compared to the targets based on planning from below. The former were understandably modest as they were based on the availability of resources and the later were ambitious as they were based on the considerations of need.

2.12 In some of the States e.g., Gujarat, officers at the top level held the view that targets for plant protection measures could not be fixed in view of the fact that control measures were undertaken only after the occurrence of pests and diseases. The approach in this case was primarily one of the tackling after a problem arose. But this may not be quite scientific as some of the diseases have their cycle of occurence. In such cases, it is necessary to plan suitable preventive measures. Similarly, some diseases have to be fought year after year to root them out or to minimise their incidence. Seed treatment, prophylactic treatment of plants, weed control, rat control, eradication of predatory birds and animals, treatment of stores and stored grains, holding demonstrations, training of staff and villagers are all quite amenable for advance planning.

2.13 Another feature of the Plans wherever they have been prepared is that they were based on too very general understanding of the situation. No scientific surveys have been carried out at any level even by the subject matter specialists. Surveys of incidence of important diseases are very necessary not only for undertaking research and for programme planning but also for evaluating the effectiveness and impact of various plant protection measures. Even with the existing level of staff, it may not be difficult

to undertake surveys on limited areas regarding the incidence of diseases and the impact of plant protection measures.

2.14 In some of the States it has been reported by the officers themselves in charge of Plant Protection that this programme has not been given the priority and the importance it deserved. With greater emphasis on Plant Protection and with more liberal provision of funds, staff and supplies during the Fourth Plan, it should be possible to have more scientific, detailed and comprehensive plans.

Assessment of resources:—Equipment etc.

2.15 Various types of equipment are needed to undertake plant protection measures such as seed treatment, spraying, dusting and fumigation. The equipment may be manually operated like the hand rotary duster, hand compression sprayer, foot sprayer, rocker sprayer, bucket pump, etc. or it may be power operated such as quadruple double tack power sprayer, combined power duster and mist blower, knap-sack or Triplex power sprayer etc. The hand operated plant protection appliances are manufactured in India and are available from the manufacturers. The power-operated appliances have to be imported from foreign countries and these have been reported to be in short supply in many States. With the increase in the popularity of plant protection measures, demand for all types of equipment is going to increase considerably. The Plant Protection Directorate at the Centre can render a singular service to the cause of plant protection if it prepares a projection of demand for different types of equipment and spare parts over the next five or ten years, and with the help of concerned Ministries at the Centre arranges for their manufacture in bulk.

2.16 A pre-requisite to the large-scale manufacture of equipment is that it should be standardised. In certain States, e.g., Maharashtra, expert committees were appointed to examine various types of appliances and to recommend the one considered suitable and reasonably priced. The standardisation of equipment, arranging for quality control at the production stage, pooling together of demand and procurement of supplies should be undertaken by the Directorate of Plant Protection at the Centre.

2.17 The detailed planning as observed earlier was limited to broad aspects of the coverage of area. The need for providing a detailed break-up of the programme under supplies, demonstrations, training, orientation of village leaders, etc. cannot be over-emphasised. Regarding supplies, the arrangements for supply or equipment and chemicals, the facilities to be provided by way of loans and subsidies, can be thought of. The extension efforts to popularise plant protection measures consist of laying out demonstrations and other usual extension methods besides organising training camps etc. for the cultivators. The need for a programme of training for the functionaries, particularly at village and block levels, on a more extensive scale, was also keenly felt to equip them for more effective extension work in Plant Protection. Detailed targets are expected to be provided with the strengthening of plant protection staff and provision of increased finance in subsequent years.

Coordination:

2.18 Coordination between various official agencies was reported to be good in the context of locust control operations. For the regular plant

protection work, however, the role of agencies other than the Agriculture Department has been quite negligible. The various legislations, as discussed earlier, mainly deal with the outbreak of pests/diseases in an epidemic form and provided for some role for the administration in this context. But the Acts were reported to be not invoked to any significant extent in any of the States. For organisation of supplies etc., the Cooperative Department was involved mainly being permissive for the cooperatives to take up this business. Thus, by and large, the role of the other official agencies was quite limited and consequently reported to have not given rise to any serious problems of coordination. The village institutions, i.e., the cooperatives and the panchayats, are given certain assignments, particularly relating to supply of equipment and chemicals and stocking them for use by the needy. But their participation in this activity was observed to be not very satisfactory. These aspects are covered in detail in chapter IV of this Report.

2.19 The Directorate of Plant Protection and Quarantine of the Government of India have set up Regional units in different parts of the country. At the time of this study, it was reported that each unit was manned by a class II Plant Protection Officer and supporting staff such as Technical Assistant and Junior Technical Assistants. The unit kept stock of pesticides and equipment like sprayers and dusters. It was provided with a motor vehicle to keep the staff mobile and to enable the unit to transport equipment and pesticides to different areas under its coverage to meet emergencies without any loss of time. These units were also expected to provide guidance to the plant protection staff in the State regarding different diseases and remedial measures.

2.20 It was observed that these regional units were rather thinly spread out. The area covered by each unit was too large to make them effective and useful. For instance, the unit at Gaya covered both West Bengal and Bihar. For the whole of U.P. there was only one unit located at Barabanki. In a large State like Madhya Pradesh, there were only two units located at Bilaspur and Indore. There was no Central Unit in Rajasthan although the Locust Control Organisation of the Government of India did function there. In times of need, the State Government had to seek the help of the Central Unit located at Pathankot in Punjab or Indore in M.P. or Palanpur in Gujarat. The States of Assam, Nagaland, Manipur, Tripura and NEFA were covered by the Unit at Gauhati.

2.21 In regard to the technical advice, it was reported in many States (such as Punjab, Madras, West Bengal, U.P., Bihar) that the Entomologists and Mycologists of the State Government were much better qualified than the Plant Protection Officers in charge of these uints. Similarly, the equipment and pesticides stocked by the Units did not make much difference to the overall supply position in the States as the latter had considerably strengthened their own staff and supplies. It would, therefore, be useful to review the functioning of these units because they are found useful only in States where the Plant Protection Organisation is still weak (e.g., in Assam). It may also be necessary to give some serious thought that in a field like plant protection which needs tackling at local levels, whether at all there is need for a supply and service organisation run by the Centre. Probably the Central Organisation can render more efficient service in this field by a well coordinated research programme of a high technical order which can strengthen the extension role at the local levels.

Administrative set-up :

2.22 In many of the States, officers exclusively incharge of plant protection work were posted at the State level. In A.P., Mysore and Orissa, such State level plant protection officers were put directly under the control of a senior officer like the Director/Joint Director of Agriculture while in U.P. and Rajasthan, Deputy Directors exclusively to look after plant protection work were stationed. In Assam, Gujarat, Madras and West Bengal, no exclusive officers were reported to have been functioning for plant protection at the State level and this work was also looked after by a regular officer under the technical advice and guidance provided from time to time by the Mycologist, Entomologist, Pathologist and other specialists. In fact, in all the States such experts were associated in plant protection programme. But the need for an exclusive officer at the State level to look after the detailed work relating to plant protection in the State and coordinate the activities on this aspect cannot be over-emphasised.

2.23 At the divisional level plant protection officers were stationed covering a group of contiguous districts, assisted by plant protection assistants or agricultural supervisors. The work at the divisional level, by and large, involved arranging prompt supplies, organising training programmes and generally providing guidance and coordination for the regular agricultural extension staff in their plant protection activities. In many of the States these Regional Plant Protection Officers were also required to mobilise personnel and material in times of emergency when large scale pests/diseases were to be combated. At the district level the District Agricultural Officer (DAO) was responsible for implementing the programme. The Plant Protection staff stationed within the district functioned under the administrative control of the D.A.O. In some of the districts as in the package areas, the subject matter specialists posted for plant protection also operate under the control of the DAO. Generally, the plant protection staff posted in the districts did not have any direct links with the State level plant protection staff. This had, to a certain extent, resulted in the plant protection staff not maintaining regular contacts with the Research Stations and their staff. The Plant Protection staff at this level were found in a large number of cases not better informed than the regular extension staff regarding plant protection.

2.24 There was no separate set-up at block level for plant protection work. The agricultural extension officer at the block level looks after this work also. The expected guidance and supervision for the block extension staff from the divisional and district level plant protection staff was always reported to be inadequate and ineffective except in some States like Bihar, Rajasthan and U.P. In a majority of the States, the situation at this vital operational level appears to be far from satisfactory. At the village level this is one of the many functions of the V.L.W., a multi-purpose worker.

2.25 The Plant Protection staff posted upto district level was provided with some sort of training in plant protection in a number of cases. The existing training facilities are discussed in detail in the next chapter. In almost all the States the training facilities were reported to be inadequate and the content and duration of such trainings differed also very widely. Due to lack of sufficient number of trained personnel, officers of the regular extension wing were posted in many cases entailing only a change in designation for them. Institutional and inservice training needs to be extended

substantially to equip the existing staff to undertake the plant protection duties effectively. The training provided for the Block extension staff including the V.L.Ws. was not only inadequate but also was limited (imparted by the district and divisional staff) mainly to the operational aspects of plant protection rather than the technical aspects. At these levels the knowledge of these functionaries was reported to be woefully inadequate to evoke sufficient response and confidence among the cultivators to adopt measures. The lower level staff were thus mainly engaged in organising supplies for plant protection while their extension part of the duties was quite limited.

CHAPTER III

Research & Extension :

(a) *Research* :

3.1 Plant Protection in our country is relatively a recent activity. Only in Punjab State, Research stations exclusively for Plant Protection work are maintained while in all other States this aspect is also covered in the general agricultural research stations. There are 8 plant protection research centres in Punjab including the one maintained by the I.C.A.R. In other States the research on Plant Protection is carried out in entomological, pathological or mycological sections of the headquarters or regional agricultural research stations. The number of such stations vary from State to State ranging from 7 in U.P. to one in H.P. and other States. There are also research centres attached to agriculture universities and colleges wherein Research in Plant Protection is carried out in some of the States like Gujarat, Kerala, M.P. and Orissa.

3.2 The eight plant protection research stations of Punjab are concerned with specific crops. The Research Station maintained by I.C.A.R. does research on problems relating to cotton and oilseeds. Of the other seven State research stations, two are intended for sugarcane and one each for paddy, citrus, hilly fruit crops particularly for that of Wooly Aphis on apple, wheat and grain with specific reference to rust and the last one for general purpose for all the crops. In these stations research on a fairly large scale is being conducted for the observed crops on aspects such as the most effective control measures for the pests and diseases related to the casual factors of occurrence, the establishment of cyclical character of certain pests and diseases and research on specific pests and diseases in a more intensive way. Research of a fundamental type on insects, pests, non-insect animal pests, crop diseases caused by fungi and Bacteria, Nutritional deficiencies, evolving disease resistant varieties, etc. is conducted in the agriculture Research Stations and Institutions of almost all the States. In these States problem oriented applied research is also undertaken wherein research is conducted to examine the efficiency of various plant protection measures and to evolve economical and effective plant protection measures for observed pests and diseases. In Maharashtra, only trials of chemicals and equipment are made to evolve effective plant protection measures while in Himachal Pradesh laboratory tests of diseased plants, etc. collected from field are made and field experiments are conducted mainly concerning efficacy tests and control measures. In Gujarat some research is conducted by State Entomologist for formulating recommendations and in Assam the research is mainly limited to efficacy tests.

3.3 The results of fundamental research are published in technical and departmental journals. In the case of applied types of research, the results are communicated to the extension staff and wide publicity is given through press, radio, pamphlets and personal contacts. The results regarding effective plant protection measures are circulated among the extension staff for adoption in the field as in A.P., Assam, H.P., M.P., Madras, Mysore and West Bengal. The results obtained are first examined by Crop Improvement Advisory Committee in Bihar and Research coordination

committee in Himachal Pradesh and then passed over to the plant protection staff or crop specialists for extension. In Kerala the results are passed on to extension staff through occasional conferences while in Rajasthan the results are discussed at the State level meetings and training camps arranged at district level and below for the extension staff. In U.P. and Maharashtra, the results are popularised through hand-bills, visual demonstrations, radio and press and the extension staff are directed to propagate and use these methods in the field for controlling pests and diseases. In Punjab where exclusive plant protection research stations exist, no systematic arrangements are reported to have been made and the results are passed on to the plant protection staff for propagation at the district level and below. Considerable time lag was reported for the results to reach the cultivators as the Research Stations do not have their own extension staff in the field. Probably there is not much justification for separate extension staff for the research stations and the need is to evolve closer contacts and lines of communication between the regular extension staff and the Research Stations to reduce the time lag.

3.4 Arrangements for research on plant protection do not exist at district level or below in many of the States and the research stations in general are organised at the most on regional basis to cover the crop tracts or tracts based on soils, irrigation, etc. and according to availability and suitability of area for locating the Research Stations. Thus, research facilities along with research in general agriculture problems at regional level are available in some of the states such as A.P., Bihar, M.P., Mysore, Rajasthan and Uttar Pradesh. In Punjab since 1961-62 with the appointment of subject matter specialist for Plant Protection in each district it is proposed to entrust about 30 farms for him to carry out four or five experiments-*cum*-demonstrations every year. In Mysore, agriculture research stations exist in almost all the districts with Entomology and Pathology divisions in each. These divisions carry out field experiments and lay trials on cultivators' fields. Field problems regarding higher technical studies are referred to the state Entomologist and Plant Pathologist by these research stations.

3.5 Research on plant protection is mainly problem oriented according to the felt needs of the cultivators. The field problems are referred to the research centres by the extension staff in almost all the states and the research stations also obtain reports of incidence of pests and diseases from various areas. The Research staff also visit the fields to collect samples and make on the spot inspection and observations as in M.P., Rajasthan, West Bengal and many other States. The cultivators sometimes directly approach the research stations with problems and with samples of affected plants in many states such as Assam, M.P., and West Bengal. However, the usual channel of communication is through the extension staff. Only in Orissa it is reported that the types of research undertaken in the Utkal University is not related to any significant extent to the plant protection requirements of the farmers. In all the other States the main activity relates to evolving suitable recommendation for effective control of pests and diseases which include chemical, mechanical, cultural and biological methods. The intensity of research of course differs from a mere efficacy trials as in Gujarat and Maharashtra to a systematic efforts for identification, classification and preparation of catalogues of the insects of the State

as in Bihar. The number of projects taken-up and completed also to a certain extent depend on the availability of qualified staff and the facilities for conducting such research.

3.6 The facilities for research on plant protection need be increased significantly, particularly below the state level. A well directed and co-ordinated approach to research is necessary and should be mainly problem oriented in states where this is not so. The identification of pests/diseases for various crops and evolving effective methods should be tackled on regional basis or better even at the district level. In many areas the extension staff was reported to be not upto date regarding the knowledge of plant protection. There is need for more effective relations between the research staff and the extension staff. The extension staff should also be given refresher training etc. periodically in the research stations. This is likely to minimise the time lag in the application of research results as also create interest among the extension staff.

(b) *Extension*

3.7 The usual extension agencies involved in popularising plant protection measures are the department of agriculture, the block agency and the private manufacturer. Below the district level the plant protection staff and in its absence, the normal extension staff of the block attend to this work also. In A.P., Orissa and Maharashtra the publicity departments of the Centre/States were also engaged in organising film shows, etc. for plant protection measures. The role of private agencies in extension was, however, limited. In Mysore, Maharashtra and A.P., the private agencies such as Burmah Shell Company had distributed some printed literature. In Bihar the private agencies were sometimes asked by the department to conduct demonstrations of pesticides and equipment at various levels. In U.P. the touring representatives of private firms were reported to be organising method demonstrations for pesticides and distributing them to cultivators. The associate organisations have not yet actively taken up propaganda except in one block in Mysore State, where the farmer's forum was reported to have been issuing regular bulletin containing information on pests/diseases, etc. The selection of the materials is attended to at the State level in many States and the supplies are also made at subsidised rates. Thus, the private agencies could concentrate at the higher level to secure the contracts while at the lower level because of big disparity in the rates, it may not have been attractive enough to undertake extension functions at the lower levels.

3.8 The methods of extension include distribution of literature, film shows, exhibition, educational tours, personal and group contacts and discussions, demonstrations and organising special campaign. At district level the regular extension staff and the Plant Protection staff provided guidance and necessary assistance to the block staff in their extension work. The district staff also organised training camps and lectures for the benefit of the block extension staff as in Bihar and Rajasthan. Large scale demonstrations and campaigns were attended to by the district level staff in many of the States. The staff at this level maintained close contacts with the villages and regularly reported to have attended to demonstrations, VLT camps, exhibitions, etc. organised in the villages. However the block extension staff was the main agency for extension work in the village and

their main method of extension was by personal contacts and group discussions in all the States. Demonstrations are dealt with separately in this chapter.

3.9 Organisation of plant protection campaigns is another important extension method wherein the P. P. staff work intensively with ready supplies of chemicals and equipment and various other facilities extended liberally. Locust control is, however, a separate class by itself taken up on an emergency basis with special facilities, etc. Apart from the above in many States special campaigns were taken up against pests and diseases as and when they assumed serious proportions and special facilities were extended for the period. Conducting campaigns were not reported from a few States such as A.P., Gujarat and Assam. In M.P., Bihar and Orissa large scale plant protection operations were reported to have been undertaken in case of severe outbreak of pests and diseases even though systematic campaigns were not organised regularly. For example in 1961-62, in Bihar a rat control campaign was organised with the chemicals supplied free and progressive cultivators trained in the operation. In the package district an area of about 2,000 acres under the rabi crops was cleared of rat menace. In the same year special campaign against cut-worm was also organised where aerial spraying was undertaken. In Kerala also during this year large scale campaign against blast disease was organised in Kuttanad area where the staff was posted, chemicals moved to convenient places and the equipment was sold at subsidised rates. Wide publicity was given for the campaign and spraying operations were taken up in an area of about 3,000 acres and disease was combated with good success. In the remaining States the campaigns are organised every year and in U.P. such campaigns form an integral part of the Kharif and Rabi campaigns. Campaigns are mainly organised when the pests/diseases are noticed or they became a serious threat to the crops in many places. The need for organising regular campaigns for prophylactic treatment cannot be overemphasised. Such campaigns for seed treatment and treating nurseries and standing crops go a long way in preventing the occurrence of the pests/diseases and the consequent loss to the crops.

3.10 The relative effectiveness of the various extension methods cannot be assessed directly but the organisation of demonstration was reported to be the most effective of all. Next in importance was said to be the organisation of (Village Leaders' Training) camps and exhibitions. In some of the areas personal contacts and group discussions were reported to be quite effective as in Madras, Rajasthan and West Bengal. But, on the whole many States reported in adequate extension efforts while some of the extension methods were not taken seriously either by the cultivators or by the extension staff. Inadequate extension efforts for plant protection measures was reported from more than four-fifths of the sample villages.

3.11 The inadequacy of extension efforts is reflected in the responses of the reporting cultivators. Of the sample cultivators 13.2 per cent reported first preference for plant protection measures including 11.8 per cent giving such preference over improved seed or fertilisers; 18.7 per cent of the cultivators reported assigning only second preference for plant protection measures next to improved seeds or fertilisers while 68.1 per cent of them gave no preference at all for plant protection measures (see

Appendix Table 3.1). More than half the respondents felt that the responsibility for taking P. P. measures lies with agencies other than the cultivators themselves including half of them believing that the responsibility for supplies should be with the Government agency while taking the measures lies with the cultivators (see Appendix Table 3.2). Again, of the respondents 80.6 per cent reported waiting for supplies of P. P. material including 41.5 per cent waiting for equipment, 22.9 per cent waiting for chemicals or subsidised chemicals and 16.2 per cent waiting for both chemicals and equipment. In addition 6.4 per cent of cultivators reported waiting for arrangements for hiring the equipment. Only 13 per cent of the respondents reported buying the material on their own without waiting for outside help. Thus, plant protection measures were mainly treated as a departmental programme by the cultivators and the awareness to take up the measures individually or on a community basis to protect the crops was not so much in evidence. (See Appendix Table 3.4).

3.12 The extension staff did not appear to command much confidence of the cultivators regarding the competency for identification of pests/diseases or prescribing treatment at the village level. The cultivators had to choose between the VLW and the other knowledgeable cultivators and more than often, the latter were preferred because of their practical knowledge. Thus, cultivators accounted for being preferred by 51.6 per cent of respondents for identification of pests/diseases and by 36.9 per cent of them for prescribing the treatment. The percentage of cultivators preferring the VLW for advice on the above two aspects came to 32.3 per cent and 36.8 per cent, respectively. (See Appendix Tables 3.3). The adoption of Plant Protection measures is dealt with in detail in the next chapter. It is suffice to note here, that the extension efforts are quite inadequate in many of the observed areas and relatively less systematic in approach. It is necessary to prepare a control chart for various pests/diseases crop-wise before each season for each area and wide publicity is given with efforts to cover the area under the required measures. At the time when the study was conducted only about a third of the relevant respondents were taking plant protection measures at various stages of crop growth.

(c) *Demonstrations*

3.13 Organisation of demonstrations is the most important extension method and as noted earlier, a large proportion of respondents opined that more demonstrations should be organised to improve the knowledge and adoption of plant protection measures by cultivators. The demonstrations were mainly in the nature of method demonstrations for chemicals and equipment while in many States composite demonstrations were laid covering plant protection measures also. In some of the selected blocks demonstrations were undertaken when pests and diseases were noticed on a significant scale and there was no regular programme for the same as in A. P. and Rajasthan. In some of the other selected blocks of Gujarat, M. P., Punjab and U. P., no demonstration were reported to have been organised for plant protection. Demonstrations for curative and preventive plant protection measures were reported from 12 out of 16 States including composite demonstrations. In Madras State composite demonstrations were reported to be not successful in drawing the attention of the cultivators to plant protection measures and hence exclusive demonstrations for plant

protection were begun, while in Assam and West Bengal, composite demonstration constituted the main type for covering Plant Protection also. The table below gives the particulars of demonstrations conducted in the selected villages for standing crops.

Area	No. of villages*	1961-62				1962-63			
		No. of P. P. demonstrations	% distribution by type			No. of P.P. demonstrations	% distribution by type		
			Method	Result	Composite		Method	Result	Composite
1	2	3	4	5	6	7	8	9	10
Package	380	68	69·1	10·3	20·6	68	60·3	8·8	30·9
Non-package	670	40	89·7	10·3	..	37	86·5	13·5	...
TOTAL	1,050	108	76·6	10·3	13·1	105	69·5	10·5	20·0

*Gross No. for 6 crops *i.e.*, Paddy, Wheat, Jowar, Sugarcane, Groundnut and Cotton.

3.14 The number of demonstrations conducted works out to about one for ten villages and this ratio is much lower for the non-package villages. Of the demonstrations, method demonstrations account for about 70 per cent while a fifth of the demonstrations were of composite type limited to package areas. Crop-wise, of the demonstrations conducted, about 62 per cent were for paddy, 12 per cent for sugarcane, 13 per cent for groundnut, 6 per cent for wheat, 5 per cent for cotton and about 2 per cent for jowar (see Appendix Table 3.5). The demonstrations were reported to be generally successful and had the desired effect. For seed treatment method demonstrations were reported to have been organised in about 24 per cent of the villages and this proportion was about 37 per cent among the package villages and 15 per cent among non-package areas. On an average the number of such demonstrations conducted for seed treatment works out better than for standing crops, amounting to three per package village and one demonstration per non-package village.

3.15 The main agency to organise demonstrations at the village level was VLW under the supervision and guidance of the departmental and block extension staff. But such guidance was reported to be not satisfactory or systematic particularly in M.P., U.P., Punjab, Orissa and Mysore. The village institutions were reported to be associated with the demonstration programme in six States, viz., Rajasthan, U.P., M.P., Mysore, Punjab and Bihar. In Kerala, Maharashtra and Madras the private agencies organised demonstrations to a limited extent mainly as a sales promotion measure.

3.16 Training in plant protection was provided to cultivators in almost all the States mainly during the village Leaders' Training Camps. Lack of finance (as in Kerala) and lack of sufficient number of plant protection extension staff (as in Himachal Pradesh) were reported to be in the way of increasingly or intensively organising the training programme for cultivators. The block extension staff including the VLWs were said to

have been trained specifically in plant protection work to a certain extent in six States viz., Kerala, Madras, Mysore, Orissa, Bihar and Rajasthan. For the district level extension staff, arrangements for training in plant protection were reported from Bihar and Rajasthan only, while such training for the staff engaged exclusively in plant protection work was reported in 6 States, viz., Kerala, Madras, Mysore, A. P., Bihar and Rajasthan. The training programme for the extension staff was reported to be not satisfactory in many States. In many areas, as noted earlier, the extension staff lacked precise knowledge regarding the pests/diseases and the measures to be taken against them. This resulted in the extension work carried out by them, more than often, routine and prefunctary without any depth. Training in plant protection on a regular basis need be arranged in the research stations for the extension staff.

CHAPTER IV

Facilities and Inducements:

4.1 The Plant Protection measures recommended and adopted in our country mainly comprise of chemical applications involving treatment of seed, spraying and dusting of standing crops and elimination of rat menace by rodenticides. For all these operations besides the chemicals, equipment such as seed mixing drums, sprayers, dusters and pumps are required. The supply of these material in adequate quantities and in time is a prerequisite for taking up effective plant protection measures. For popularising adoption of Plant Protection measures among the cultivators various incentives and facilities such as subsidies on the purchase of pesticides and equipment, renting out equipment on nominal rates etc. are provided. In this chapter the arrangements for supply, the timeliness and adequacy of such supplies and the various agencies involved are analysed. The pattern of subsidies, the extent of credit facilities available and the extent to which they are useful and effective are also examined. The information and data collected at various levels (including the respondent cultivators) on these aspects are presented at appropriate places.

(A) *Types of chemical in use*

4.2 Organo Mercurical compounds are extensively used for seed treatment since 1950 in many States. Of the insecticides, Chlorinated Hydro-Carbons such as BHC, DDT, Aldrin, Dieldrin and Endrin are very popular for treating standing crops. BHC and DDT were the earliest adopted, as far back as 1945 in Mysore while Endrin came into the field only in early fifties. These three insecticides are at present widely used in all the States. Aldrin and Dieldrin were put in the late fifties only and in use in a few States. Of the Organo-phosphorous compounds, mention may be made of Parathion, Malathion and Diazinon. Of these, Parathion was put into use in many States in the mid-fifties while Diazinon was used for the first time in 1961 in Maharashtra. Of the other insecticides, Nicotine-Sulphate is the most important chemical in use in more than a third of the States. The earliest adoption was reported by Punjab closely followed by Maharashtra, Madhya Pradesh and Himachal Pradesh in the fifties.

4.3 Among the fungicides in use, copper fungicide in the form of Bordeaux Mixture and Burgundy mixture are very important. The use of Bordeaux Mixture was reported from Maharashtra from 1925, from Madras and Mysore since 1945 and in the other States since the early fifties with the exception of Orissa and Punjab where adoption of these was delayed upto late fifties. Sulphur fungicide was in use in Mysore since 1945 while Madras and Himachal Pradesh reported its use since early fifties and the remaining States much later. Weedicides were mostly at the stage of trial and experimentation and wider adoption of the same was not yet found in any part of the country. Zinc Phosphide was the widely used rodenticide and its earliest users were Punjab and Maharashtra while the other States adopted the same subsequently in the fifties. Fumigants like Cymag and Cynogas were used only in a few States since 1950.

(B) *The Selection of Plant Protection Chemicals for canvassing adoption*

4.4 The chemicals are supplied by private manufacturers or formulators of insecticides in all the States. The agriculture department at the State level selects the various chemicals for control of pests and diseases occurring in the State. The selection is generally made after conducting regular laboratory and field tests of the chemicals in question. The particular pesticide is at first tested in the laboratory, and if proved satisfactory, is put on trial in a wider area either in the State Research farms or in the fields of cultivators. When the efficacy of the pesticides is, thus, proved beyond doubt, it is recommended for wider use in the area for a particular pest or disease. The State level officer incharge of plant protection in consultation with the State Mycologist and Entomologist or Pathologist, recommends the particular pesticides and places orders with a particular agency for supply of the estimated quantity of the chemical.

4.5 The above procedure for selecting the chemicals in one form or the other was reported in 11 out of 15 States. Preference was generally given to ISI stamped brands while in other cases the specifications were laid down by the department and when actually supplied, the chemicals were analysed to ensure that the specifications were adhered to. In Maharashtra, the pesticides recommended by the various firms were given extensive trials against the various pests/diseases for 3 to 4 years, and if found useful and economical, were recommended for general use. In Kerala chemicals bearing ICI mark were preferred and where such brands were not available, the chemicals were analysed against specifications before recommending them for adoption. In Madhya Pradesh the State Plant Protection Officer selected the pesticides on the basis of reports from other States and even from abroad. In the case of new chemicals, after departmental trials, the successful pesticides were selected for purchase and general release. In Himachal Pradesh, on the basis of samples and literature, a list of approved suppliers for supply of various types of pesticides was drawn and depending upon the budget allotment, the various supplies were ordered from the approved list of manufacturers and formulators.

4.6 The above analysis indicates that in many States the products were analysed against specifications before selecting the pesticides for advocating adoption by the cultivators. However, the products conforming to ISI specifications should be given preference over other brands in States where this is not being done. But still it is difficult to pick the best one among the large number of pesticides available in the market in view of a lot of trade names assigned to the pesticides by the various manufacturers and formulators with differing concentrations and percentages of active ingredients. In this context it may be observed that the cost factor was also laid down by Technical authorities as an important consideration for selection of the chemicals. In many States, it appeared that this criterion for selecting the pesticides was not given due consideration. Therefore, it is necessary to ensure that the most economical pesticides in the sense that the cost per unit of treatment is the minimum, should be selected.

(C) *Agencies for distribution of chemicals*

4.7 The supplies are arranged in all the States through private manufacturers or formulators. Many of them have their agents located in important towns and cities of the various States. In some States like Mysore, Maharashtra and Gujarat, the Cooperatives are also given the agencies of

the private manufacturers for distribution. On the basis of tenders, the private agencies are invited to supply the chemicals under prescribed conditions for particular chemicals. The Regional units of the Central Government located in the States also attend to supply of chemicals to the department or individual cultivators when approached. Arrangements exist for stocking the chemicals at State level with the department in a few States as in Uttar Pradesh, Rajasthan, Punjab, Orissa and for West Bengal, to a limited extent with the State Entomologist and Mycologist. In Mysore the State Marketing Society has undertaken the distribution of chemicals.

4.8 The district agriculture Officer at the district level is an important agency for stocking pesticides and insecticides to supply for the needy cultivators in time. Thus, in 9* out of 15 States, arrangements exist for stocking the chemicals at the district level. In Mysore, Bihar and Gujarat private agents attend to this work at the district level. In Himachal Pradesh, in addition to stocks maintained at the district level, some stocks exist at the six plant protection sub-centres and with the departmental research farms in the State. In U.P., the Plant Protection Service Centres hold stocks at the Regional level, and the sub-centres, at the district level. In Punjab, in addition to stocks with the department available at the district level, two other agencies namely the sub-agents of the private agencies and the district marketing societies hold stocks. In Orissa chemicals are stocked at the range headquarters covering 3 or 4 districts as also at the district level. Below the district, upto the block level, arrangements exist for the distribution of chemicals in all the States mainly by the departmental agency. Only in the three States of Maharashtra, Mysore and Gujarat are the cooperatives closely involved in the distribution; in Maharashtra, the sub-agents of the private agents are also active at this level.

4.9 At the village level, the VLW is the most important agency for distribution of chemicals in 6 out of 15 States under study. In view of lack of adequate storage facilities the VLWs keep only minimum stocks with them and get replenishments from block level at regular intervals according to seasonal needs. Thus, the arrangements for supplies are through the VLWs in the villages of H.P., Assam, West Bengal, Madhya Pradesh, Rajasthan and Orissa. In Rajasthan in addition to the VLW, the village panchayats in some areas stock the pesticides and attend to distribution. In Orissa, the village Panchayats are entrusted with the responsibility of stocking and distributing the material but in many cases they fail to discharge this duty, thus shifting the responsibility to the VLW to attend to the same along with his extension duties. In U.P., the village baniya deals in P.P. chemicals also along with his other merchandise. No regular arrangements for distribution are made at the village level in 5 States, viz., Punjab, Bihar, Andhra Pradesh, Madras and Kerala. In these States, the chemicals are to be obtained normally from outside the village with the help and guidance of the VLW and the block extension staff. On the whole, the supplies are obtained by 54 per cent of the selected villages from the Government agency including the VLW while only a fourth of the villages are served by the village institutions like the Cooperative and the Panchayat. The remaining villages are served by the manufacturers and the local merchant. (Appendix Table 4.1.)

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*H.P., U.P., Rajasthan, Punjab, Assam, West Bengal, Orissa, M. P. and Andhra Pradesh.

4.10 The supply arrangements were reported to be adequate at the village level in ten* out of 15 States. In the remaining five States supply points were reportedly inadequate. In Uttar Pradesh, the cultivators had to walk long distances for getting the required chemicals as the arrangements at the village level were quite inadequate. In Punjab also the same situation was noticed as the facilities were available at the block headquarters only. In the selected district of H.P. the facilities were reported to be adequate where the marketing societies were incharge of the distribution of chemicals. But in non-package areas, the cultivators went upto Tehsil and block headquarter places for obtaining chemicals. In Mysore State although the Cooperatives were entrusted with the distribution of plant protection chemicals yet many large sized cooperatives and even the Taluk marketing cooperatives were yet to take up this business. The cooperatives in general were reported to be less interested in this business due to lesser margins of profit and lack of technical guidance in dealing with the chemicals. In the areas where vegetables are raised or paddy and sugarcane are grown, the private agencies opened their own depots in the interior parts. They were doing good business. In Bihar villages also the cultivators had to travel long distances to the nearest Plant Protection Centre, which in non-package areas covered three development blocks and in the package areas, one such development block.

4.11 The supply arrangements at the village level appeared to be far from satisfactory. Of the sample villages, only about 27 per cent had the supply depots of one agency or the other located within the village while in the remaining villages, the cultivators had to go out to obtain the supplies from the neighbouring villages or the block headquarters. The position was slightly better in the villages covered under the IADP where the proportion of villages having supply depots within the village was of the order of about 30 percent compared to 23 percent in the other non-package villages as a group. The analysis of the distance of the depots from the villages is more revealing. The depots were located at 1 to 3 miles distance for 38 percent of the villages while another 22% of the villages were served by depots located at 3 to 5 miles distance from the village. The remaining two-fifths of the villages were served by depots located at a distance of 5 miles or more including more than a third of these served by depots located at 10 miles or more. Details regarding the agency-wise supplies and location of depots are presented in Appendix Table 4.2.

4.12 At the household level, more than half the cultivating households reporting plant protection measures, had obtained their requirements of chemicals from the private agencies. The table below shows the percentage distribution of sampled households using plant protection chemicals, according to the source of supplies.

*A.P., Assam, Gujarat, Kerala, Maharashtra, Madras, Orissa, Rajasthan, West Bengal and Himachal Pradesh.

4.I. *Percentage of respondents taking P. P. measures under each category by sources of supply of chemicals.*

Supply	Seed treatment			Standing crops			Rodenticides		
	Package	Non-package	All areas	Package	Non-package	All areas	Package	Non-package	All areas
1. Own supply	6·6	1·6	3·7	2·7	1·4	1·9	0·3	4·9	3·3
2. Block/ Deptt.	28·4	15·6	21·2	30·5	25·5	27·4	46·2	31·0	36·3
2. Co-operative	16·0	7·8	11·4	31·8	8·7	17·6	13·8	0·6	5·2
4. Panchayat	1·7	..	0·5	0·5	0·3	0·3	1·4	2·6	2·2
5. Private agencies	39·6	66·0	54·7	29·6	59·6	48·1	36·2	58·2	50·5
6. Others	7·8	9·0	8·5	4·9	4·5	4·7	2·1	2·7	2·5
TOTAL	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

4.13 From the above table it is clear that the private agencies cater to a larger proportion of cultivators for all types of plant protection measures. However, in the Package areas, the role of official agencies is more prominent. In this context it is interesting to note that the private agencies compare unfavourably with the official and institutional agencies regarding their location of supply depots in the interior parts. Out of the total selected villages having supply depots or depots within 5 miles distance from the village only 16 per cent were owned by the private agencies while the share of Government and village institutions, respectively, came to 56 and 28 per cent respectively. But the share of private agency in the distribution of chemicals was more than the combined share of the Governmental and institutional agencies. This situation may be partly due to liberal extension of credit by the private agency and timely supplies of preferred chemicals compared to governmental and cooperative agencies. There is need for more actively involving the village Cooperative and Panchayat in stocking plant protection material and supply to cultivators.

4.14 There is much scope to improve the facilities for stocking pesticides and supplying them at various levels. Pesticides should invariably be stocked at the block headquarters. At the village level stocks can be maintained at the Panchayat and village cooperatives. In view of uncertainty of demand and lack of experience in the line, these institutions may not like to incur losses on this type of transactions. It should be possible for the block agency to entrust stocking the pesticides with these institutions on its behalf and the VLW charged with rendering the account and money to the block-agency periodically. The VLW instead of directly maintaining stocks of pesticides as is now done in some States, may be made responsible to maintain the stocks at the Panchayat and village cooperative and should be able to augment the supplies according to local needs. It is very important to locate stocks of pesticides at convenient places for the cultivators to ensure effective adoption of plant protection measures. More than often the awareness created among the cultivators with lot of extension effort is lost due to non-availability of chemicals within the convenient reach of villages. There is need to examine this aspect in greater detail.

(D) *Types of equipment in use and their mode of selection*

4.15 Suitable equipment for effective application of chemicals is a pre-requisite for all plant protection measures. This ensures the chemical to be uniformly distributed over the surface of the area/material to be treated for effective action against the pest or disease, as also effect economy in the use of the chemical itself. More often than not the ineffectiveness of a control measure could be traced to improper equipment, whether it is for seed treatment, for treating standing crops, or elimination of rodents. Thus, the selection of proper equipment is as important as the chemical itself.

4.16 Sprayers and dusters—both power operated and manually operated—were widely used in all the States under study. The earliest use of manually operated dusters and sprayers was in Punjab in 1932, while in other States wide adoption was reported around fifties. The power dusters were also in use in many States from a long time and their general use in more recent past was reported from Maharashtra (1961) and Madras (1962). Along with power dusters, the power sprayers also came into use and their wider adoption was reported from many States from the middle of fifties. The other important type of equipment is seed dressing drum which was reported to be widely used, only in 6 States, *viz.* Rajasthan, Bihar, M.P., West Bengal, Orissa and Kerala, of these the latest to adopt was Orissa in 1956-57. Flame throwers are popular only in Assam, M.P. and Orissa.

4.17 The equipment are selected in many States on the basis of actual trials in the fields by the department, and if proved successful, released for general use to the cultivators. In Mysore, the sturdiness and simplicity of the mechanism is also considered with a view to ensuring easy repairs locally and make spare parts easily available in case of wider adoption in the villages. In Maharashtra and Gujarat, expert committees are constituted for selecting the equipment. In West Bengal, as per the recommendations of the State Mycologist and entomologist, the equipment is purchased through tenders. In H. P., the proposals of the Plant Protection Officer are put before the Plant Protection sub-committee at the State level. The equipment so selected is first put in use by the departmental staff, and if found satisfactory, is finally selected for general use by the cultivators.

(E) *Supply Agencies for Equipment*

4.18 Private manufacturers are the only source for supply of equipment in all the States. The manually operated equipment is manufactured within the country and the production is concentrated in the States of Gujarat, Maharashtra, West Bengal and Madras. The other States mainly depend on the firms located in the above four States, particularly, in Calcutta and Bombay. Indigenous production of hand operated dusters and sprayers to a limited extent was reported from A. P. and Mysore also. The power operated equipment was not being manufactured in the country. The engines were imported and fitted to the equipment by Indian firms. In view of import restrictions, the position regarding supply of power operated equipment was not satisfactory.

4.19 In many States the equipment was supplied to cultivators at subsidised rates. But the main emphasis was supply on free or hire basis because of the poor financial position of the cultivators who could not acquire the equipment individually. The department of agriculture was keen in

all the States in locating the equipment at various levels in convenient places within the reach of the needy. Incentives were also offered to institutions at village and higher levels to acquire the equipment and make the same available to cultivators on nominal rents. Such equipment was also intended to be mobilised in cases of large scale attacks of pests and diseases.

4.20 The Plant Protection equipment was made available in the agriculture offices at the district level and above as also in the Plant Protection units and centres, (wherever these exist) in all the States. The block offices also, were to keep stocks of equipment and where necessary arrange for their supply from outside. At the village level, the VLWs in all the States maintained a few sets of equipment for demonstration purposes as also to loan them to needy cultivators. In a number of States the village panchayats have acquired the equipment, while only in a few States like, H.P., Mysore and Gujarat Cooperatives also were reported to have acquired the same. For private aquisition the block agency in many areas arranged the supplies to cultivators on cash payment either through the private agencies or the agricultural department. Only in a few States, the cooperatives were dealing in the sales of equipment. The availability of equipment at village level for the use of cultivators may be seen in Appendix Table 4.3.

4.21 The availability of equipment at the village level was quite unsatisfactory as revealed by this analysis. The main agency keeping equipment at this level was the Government agency including the VLWs serving about three-fourths of the villages regarding sprayer and dusters and about two-fifths of the villages for seed dressing drums. In the Package villages, this proportion was higher than in the non-package villages. A quarter of the villages were served by village institutions for sprayers while for other equipment this proportion was quite less. The role of the private agencies was quite limited in this context. The cultivators did not possess any seed drums apart from those available with the agencies while a fourth of the available stock of sprayers was held by cultivators individually. A negligible percentage of total dusters were held individually by cultivators.

4.22 The number of equipment available in the villages was quite less. Seed dressing drums were in use in 9 States only and in the selected villages of these States the availability of drums was at the rate of one for two villages. The position was slightly better in Package villages where the availability on an average was 2 drums for three villages. Sprayers were quite popular and were available at the rate of more than 3 sprayers per village in Package areas and more than 2 sprayers in the other villages. Individual ownership of sprayers by cultivators was also quite common. In the case of dusters, only a negligible part of the stock was held individually and the availability was slightly more than one duster per village on the average. The village institutions should be induced to acquire plant protection equipment. It was observed in many areas that the equipment was made available free of charge to the cultivators which should be discouraged. Nominal rental charges should be collected to cover the expenses for minor repairs and up-keep. This will also to a certain extent promote the judicious use of equipment.

4.23 Besides availability of equipment, facilities for getting the same repaired is also important. Minor repairs for manually operated equipment were generally attended to within the village cycle repairing shops. Only in Madras State, the VLWs were reported given training to attend

such minor repairs. But for major repairs the facilities were available outside the village only. In Bihar, A.P., Maharashtra and Kerala, the staff along with repairing facilities were stationed at district headquarters places while in all the other States except Orissa, such arrangements were made at regional level covering a few districts. In Orissa a single mechanic posted at the State headquarter was expected to look after this work throughout the State. However, the officers stationed at the district level or above attended to such repair work at lower levels during their tours. In this way the blocks were also covered in four States, viz., West Bengal, U.P., Maharashtra and Madras while touring officers covered upto district level in the States of H.P., West Bengal, U.P. and Rajasthan. Apart from the above departmental arrangements, private repairing facilities were also available in the bigger and important places. There is need for making regular arrangements of repair at least upto the block level.

(F) *Adequacy and timeliness of Supplies*

4.24 The supply position regarding plant protection chemicals was reported to be adequate, in time and generally satisfactory in the States. However, in West Bengal supplies of Copper fungicide could not be secured from any agency during 1963-64. Imported chemicals only were reported to be in short supply as also untimely particularly in Maharashtra and U.P. Endrine was reported to be generally in short supply in A.P. and West Bengal and some times in H.P. Shortage of Folidol was reported from Mysore and Dithane was not sufficiently available in Madras State. Sulphur and 2, 4-D were not easily available in Rajasthan. However, there was no short supply reported for any of the formulations of private agencies. In fact in the interior part of M.P. and U.P., huge accumulation of stocks was reported un-utilized due to inadequate extension efforts. BHC 50 P.C. dust was also reported to be in surplus in U.P. and West Bengal. Regarding the availability of equipment, in many States the equipment was reported to be adequate at the present level of adoption of P. P. measures. Only in M.P. and A.P., the equipment was reported to be inadequate while in Assam for preventive measures the available equipment was reported to be sufficient; but inadequate in case of large scale incidence of pests and diseases. Shortage of power operated equipment to some extent, was reported from all the States.

4.25 At the village level, the supply arrangements were satisfactory in 10 out of 15 States as noted in the earlier section. In the remaining States, the cultivators' had to cover long distances to obtain the supplies. The position regarding the timeliness of supplies remain unchanged during the three years from 1960-61 to 1962-63 without appreciable improvement and roughly two-thirds of the sample villages reported timely supplies. The main reason for untimely supplies was attributed to the inadequacy of chemicals and poor maintenancc of equipment available at the village level.

The responses of sample households, regarding the timeliness of supplies, of chemicals and equipment are analysed in the following statement which is self explanatory.

4.II. *Percentage of Respondents reporting timely and untimely supplies during* 1959-60 *to* 1961-62

Year	% of respondents reporting timely supplies of			% of respondents reporting untimely supplies of			Total
	Both equipment & Chemicals	Equipment only	Chemicals only	Both equipment & Chemicals	Equipment only	Chemicals only	
1	2	3	4	5	6	7	8
1959-60							
All villages	18·15	23·30	56·93	..	0·76	0·86	100·00
Package villages	18·30	31·03	49·87	..	0·53	0·27	100·00
Non-package villages	18·06	18·96	60·89	..	0·90	1·19	100·00
1960-61							
All villages	17·39	22·16	58·28	0·08	1·59	0·50	100·00
Package villages	19·40	29·96	50·40	..	0·21	..	100·00
Non-package villages	16·12	17·21	63·25	0·14	2·46	0·80	100·00
1961-62.							
All villages	17·62	20·01	57·68	0·37	2·09	1·23	100·00
Package villages	21·41	27·99	48·50	0·15	0·90	1·05	100·00
Non-package villages	14·97	16·13	64·09	0·52	2·93	1·36	100·00

4.26 Preferences for particular types of plant protection chemicals other than the recommended types was not in evidence any where, and the recommended chemicals were only used by the cultivators. However, in a few States among the recommended types preference for particular types was observed. BHC and DDT were widely used and preferred in the States of Bihar, West Bengal, Madras and in the fruit growing hilly areas of U.P. In Orissa and M.P. BHC was preferred over other chemicals in view of low price and the effectiveness of the chemicals. Sometimes the preferences were observed to be varying according to the need and the

areas as in Bihar, where Agrosan was widely used but Aldrin was preferred for rabi crops against white ants and cut worms, Organo-phosphatic chemicals in vegetable tracts, Diezinon and Parathion for mite control, Dithane for late blight etc. Parathion was in wide use in Madras and Kerala also. Along with BHC and DDT, Endrine was widely used in the Southern and Eastern States. Gammaxine was very popular in U.P. and West Bengal. Particular popularity was noted for Basodine, Nicotine sulphate and folidol in Punjab while Lime Sulphur was widely in use in the Hill districts of U.P. The department should analyse the reasons for some of the chemicals becoming popular in some of the areas, and if found rational, efforts should be made to stock the same according to the estimated demand to ensure timely and adequate supplies. Such information would also help the department in its extension efforts in other areas where such chemicals are relevant for adoption.

4.27 There were no serious complaints regarding the efficacy of any of the chemicals in use in any of the States. This was mainly due to the testing of chemicals at various levels. However complaints regarding the loss of quality in storage for some of the chemicals was reported from the interior villages of Orissa and Bihar. In U.P. and H.P., there were reports of supplies of inferior quality products and consequently, the sources of supplies were changed. The ineffectiveness of a chemical cannot, however, be solely attributed to the inferior quality of the same. The effectiveness is to a significant extent dependent on the stage of pest/disease attack, the proper application of the chemical and under proper conditions. Care should also be taken to see that the chemicals do not deteriorate in quality due to improper storage or defective packing. Though it is not possible to indicate any level of effectiveness as "normal", the proportion of sample respondents reporting effectiveness of chemicals according to the manner of acquisition appear to be satisfactory as can be seen from the summary statement below :

4.III. *Percentage of Respondents reporting effectiveness of chemicals by mode of supply*

Mode of supply	Seed treatment			Paddy standing crop			Rodenticides		
	Package area	Non-package area	All area	Package area	Non-package area	All area	Package area	Non-package area	All area
1	2	3	4	5	6	7	8	9	10
1. Free supply	100·0	87·5	94·1	100·0	100·0	100·0	86·6	95·1	90·6
2. Subsidised supply	77·6	88·9	84·9	82·4	92·6	88·6	100·0	100·0	100·0
3. Full cash payment	89·7	90·0	89·7	90·1	93·2	92·2	75·2	87·9	83·9
TOTAL	84·6	88·6	86·9	89·7	93·3	92·1	80·0	89·6	86·0

Pattern of subsidies

4.28 Plant protection chemicals and equipment were supplied at subsidised rates in practically all the States. A subsidy of 25 per cent on the sale of chemicals was provided by the Central Government and the actual pattern of subsidy differed to some extent from State to State. In 8 out of 15 States viz., A.P., Bihar, Gujarat, Kerala, Maharashtra, H.P., Orissa and Rajasthan 25 per cent subsidy was provided. In the States of Assam and West Bengal 50% subsidy was available on all the chemicals, of which half the share was borne by the Central Government. In Mysore, 50 per cent subsidy was allowed for control of pests/diseases on oilseeds and 25 per cent for cotton under the oilseed development Scheme and Sea Island Cotton Development Scheme, respectively. Similarly, in Madras 50 per cent subsidy on the sale of chemicals was provided for commercial crops by the respective commodity Committees such as cotton, oilseeds, coconut and tobacco, while for food crops such as rice and ragi 25 per cent subsidy was provided. Since the constitution of the Panchayat unions in the States in 1961-62, the 25 per cent subsidy for food crops was being met from the Panchayat union funds upto a ceiling of Rs. 3,000. Over and above this limit the needs were met by the State Government. In Punjab, under the various schemes, the Central Government gave a subsidy of 25 per cent on the chemicals sold while during times of large scale attack of pests and diseases, the remaining 75% cost was fully met by the State Government. Under oilseeds Development and cotton intensive programmes, the Central Government provided a subsidy of 50 per cent and 25 per cent respectively, while the State did not contribute for any additional subsidy for the above schemes except providing 25 per cent subsidy under fruit cultivation in hilly districts. In Himachal Pradesh the subsidy in the form of free transport charges for chemicals upto block level was available. Only in U.P. no subsidy was allowed on the sale of chemicals.

4.29 Provision for allowing 50 per cent subsidy on Plant Protection equipment existed in all except three States viz., M.P., Punjab and U.P. This subsidy was also extended to purchases made by cooperatives in Gujarat and Madras and to Panchayats in Rajasthan and Gujarat. In M.P., the 50 per cent subsidy was allowed to cooperatives and Panchayats only. In Punjab, a 25 per cent subsidy was allowed on equipment under the pest control schemes wholly contributed by the Central Government, while the State Government decided the quantum of additional subsidy, if any, from time to time. In U.P. 33 per cent subsidy was allowed on all agriculture implement including P.P. equipment. In Madras besides 50 per cent subsidy for cultivators, the Panchayat unions supplied the equipment at 1/3rd cost, meeting the 2/3rd subsidy from the union funds. In Orissa, the 50 per cent subsidy was reduced to 25 per cent from 1962-63. In H.P. and Bihar, the subsidy for supply of implements to cooperatives

and Panchayat was reported to have been discontinued. The rates of subsidy during the period of our study in various States may be seen in the table below :

4.IV. *Particulars of subsidy available on Plant Protection Material in various States*

Sl. No.	State	Percentage rates of subsidy on	
		Chemicals	Equipment
1	2	3	4
1.	A. P.	25	50
2.	Assam	50 to 100	50 to 100
3.	Bihar	25	50
4.	Gujarat	25	25—50
5.	Kerala	25	50
6.	M. P.	25	25
7.	Madras	25 to 50	50
8.	Maharashtra	25	25 to 50
9.	Mysore	25 to 50	50
10.	Orissa	25	25
11.	Punjab	25 to 100	50
12.	Rajasthan	25	50
13.	U. P.	Nil	33
14.	West Bengal	50	50
15.	H. P.	Nil	50

4.30 It is evident from the above that the pattern of subsidy varied from State to State and even within the State, the quantum of subsidy differed from scheme to scheme. In some cases, the pesticides, were also sold on no profit no loss basis. Thus, the departmental and institutional agencies had to charge different prices under different schemes for the same material. There was need to integrate all the schemes so as to facilitate a more rational and firm basis for the supply of these materials. In Maharashtra such integration was attempted with advantage. There was also another difficulty pointed out by the private agencies that they were not able to successfully operate the sale depots charging full rates while the official and institutional agencies could supply the same at subsidised rates. This could not have been helped under the existing policies of subsidised supplies which are essential till such time the cultivator became fully aware of the need for P.P. measures. But till then there seems to be a good case for extending the benefit of subsidies to sales by private agencies also in the shape of rebate on actual sales made by such agencies. Such a procedure may also promote the supply of chemicals at the village level particularly in such areas not adequately served by other public institutions. In this context, it is interesting to note that the chemicals were mainly purchased on cash without any subsidy in a large number of cases for

Rodenticides and for standing crops. The table below gives the percentage distribution of cultivators according to the mode of acquisition of chemicals for Plant Protection measures :—

4.V. *Percentage distribution of Respondents by mode of supply of chemicals*

Mode of supply	Seed treatment			Standing crops for			Rodenticide		
	P.	N.P.	Total	P	N.P.	Total	P	N. P.	Total
1	2	3	4	5	6	7	8	9	10
Free supply	21·6	13·6	16·8	6·9	3·1	4·4	38·3	21·1	27·6
Subsidised supply	60·5	82·2	73·4	14·7	12·1	13·0	1·7	1·4	1·5
Full cash payment	17·9	4·2	9·8	78·4	84·8	82·6	60·0	97·5	70·9
TOTAL	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

4.31 The supply of chemicals freely or on subsidy was available to about 90 per cent of the cultivators for seed treatment while this proportion was about 18 per cent for measures on standing crops and about 30 per cent for eradication of rodents. (Among the Standing crops relevant for plant protection measure, only paddy was considered as the cultivators undertaking measures for other standing crops was only a small fraction of the former and was not significant). Though the subsidised supplies were more in regard to seed treatment, the average cost of chemicals per acre for this process was relatively less compared to measures undertaken under the other two heads. Thus, financially the benefit from subsidised supplies was quite meagre even though the provision of subsidy was made in most of the States for Plant Protection measures. Thus, there is a case for integrating the various schemes and allowing uniform rates of subsidy to a certain extent as also to extend the facilities to cover the private agencies. It should be emphasised that the quantum of subsidy should be related to the cost of cultivation and the risks involved in cultivation of certain crops requiring larger quantum of subsidy for Plant protection measures. For supply of equipment there is need for extending the provision of subsidies, particularly for acquiring the same by the village institutions.

4.32 Plant Protection equipment was made available by the department and village institutions in many of the States free of charge or on nominal rates of rent. For locust control and in cases of large scale control campaigns, the department directly took up the operations in all areas mobilising labour, equipment and chemicals. In U.P., charges at scheduled rates were collected for plant protection measures for pests and diseases covered under the schedule while in other cases free operations were undertaken by the department. The usual *takkavi* agriculture loans and cooperative credit sanctioned could be used for purchase of P.P. material also. In H.P. loans

for purchase of P.P. material was granted under the fruit development scheme while under the Grow More Food scheme, 50 per cent loan and 50 per cent subsidy was granted for Plant Protection equipment. In Maharashtra also loans were given for P.P. measures during the campaigns. Hire-purchase system for acquiring equipment was not yet popular in any of the areas. It may be tried experimentally by the departments of agriculture in selected areas and to begin with for the institutions and can be extended if found helpful and encouraging to other areas. More liberal policy of extending credit in a larger measure for acquiring equipment is also indicated.

CHAPTER V

Knowledge and Adoption of Plant Protection Measures

5.1 The research and extension, organisation of supplies, etc. are aimed at the cultivator who is the ultimate beneficiary and on whom the extent of success or otherwise of such efforts depend. In this chapter the data collected from the sample cultivators regarding the extent of knowledge they possessed on the plant protection measures, the sources from which such knowledge was obtained, the extent of adoption of the measures, the reasons for non-adoption, etc. are analysed. As a background information the details of the characteristics studied and the broad tabulation plan may be helpful to be briefly noted before presenting the analysis.

5.2 As indicated in the first chapter, the plant protection measures were broadly classified into four categories of control measures, viz., chemical, cultural, mechanical (including physical) and biological. The preventive or prophylactic measures and the curative measures were studied with reference to stages of storage, sowing and standing crops. The curative measures were understood to be those where the control measures were to be applied when the pests/diseases were actually noticed at the various stage of crop growth. In the case of adoption of plant protection measures, the measures were studied with reference to seed treatment, treatment of standing crops and eradication of rodents. The agencies involved in the programme were grouped under four categories—viz., Governmental agencies including block agency, institutional agencies covering the village cooperative and panchayat, private agencies and others consisting of cultivators and progressive farmers. The tabulation was done for 9 crops and residual crops; where such elaborate tabulation was not warranted, only four important crops were taken. The 9 crops were paddy, jowar, wheat, groundnut, sugarcane, cotton coconut, arecanut and fruits and vegetables; the first four crops were considered important for limited tabulation. Many of the tables were prepared Statewise with camparative data for package and non-package areas. The tables are presented in the appendix and the classifications and characteristics are merged or presented in detail according to the sample size distribution in each cell and the importance of the information. For Statewise and cropwise tables, the totals and the percentages computed are given in brackets below the figures. For individual States the sample size is generally in multiples of 100's and hence the figures can be readily appreciated.

(A) *Knowledge of Prophylactic Plant Protection Measures* :

Chemical Measures

5.3 Of the various prophylactic measures, the chemical control measures were better known than the other types. This is, of course, to be expected in view of the extension efforts mainly aimed at popularising the chemical methods which give perceptible and quick results. Among the total sample cultivators, about 30% had the knowledge of chemical measures compared to about 15% and 10% of them reporting knowledge of mechanical and cultural methods respectively for one stage or the other

viz., storage and standing crop. The biological measures are not relevant in this context. The level of awareness of the chemical measures was higher in the package villages, at 34.62% of the cultivators compared to non-package villages (26.27). There was also much variation from State to State in this proportion of cultivators. In Assam, no cases of awareness were reported and in Orissa, only 5 cultivators, out of 200 reported knowledge of these measures. Of the other States, Punjab and H.P. headed the list with about 80% of the cultivators aware of the preventive chemical measures, followed by Bihar, A.P., Mysore, J. & K. and Kerala with 40 to 55%. In Gujarat, M.P. and U.P., about 20 to 40% only had such knowledge. In Maharashtra, Rajasthan and Madras, on an average, one out of every eight cultivators reported knowledge of the measures and this proportion was less than a tenth in West Bengal. The level of awareness was better in the non-package areas compared to the package areas in the States of Gujarat, Maharashtra, Rajasthan, U.P. and West Bengal as can be seen in the appendix Table No. 5.1. The summary table below gives the percentage distribution of respondents by their knowledge of chemical measures and according to stage of crop :—

5.I. *Percentage of respondents reporting knowledge of chemical measures among the respondents reporting awareness of one or the other of the Preventive Plant Protection Measures*

Area	Stage of Crop					
	Storage	Sowing	Standing Crop	Storage & sowing	Sowing & Standing Crop	Storage & Standing Crop
1	2	3	4	5	6	7
Package . . .	24·5	58·4	50·2	5·2	25·5	0·4
Non-package . .	35·1	57·5	18·7	2·8	7·5	3·2
All Areas . .	30·3	57·9	33·1	3·9	15·7	1·9

5.4 The sowing and standing crop stages are more relevant for cultivators and accordingly, in the field, the extension efforts are primarily directed to these stages in regard to preventive measures. The proportion of respondents reporting knowledge for these two stages was consequently more. The tempo of plant protection work in general increased with the implementation of the development programmes and as observed earlier, a real beginning was made in early fifties in this direction in many States. It will be interesting to analyse the proportion of respondents who were aware of these measures before and after 1955-56, the last year of the First Five Year Plan. Of the respondents having knowledge of the measures at the sowing and standing crop stages, the proportion who acquired such knowledge after 1955-56 was more than 85% while for storage the proportion was 67.2%. The proportion was higher in the package areas compared to non-package areas.

5.5 The principal agencies responsible for spreading knowledge of those preventive measure were reported to be governmental agencies and 'others', while the role of private and institutional agencies was found to

be insignificant. The 'others' category was also mainly of the nature of a secondary type of source as this category consists of other cultivators who obtained their information from the governmental agencies in their turn. Thus, of the relevant respondents and under each stage of crop, the proportion obtaining knowledge from governmental agencies was of the order of 58.5% for storage, 61.3% for sowing and 59% for standing crop. The institutional agencies were reported to be responsible for spreading knowledge among 1 per cent of the respondents under storage and 1.4% for sowing stages. The private agencies accounted for less than 1% of the respondents in both these stages. The remaining respondents reported knowledge from 'others'. (Appendix Table 5.2).

5.6 The cultural and mechanical preventive measures were less known than the chemical measures. 10.37 per cent of the respondents reported knowledge of cultural measures and this proportion was higher in non-package areas (11.53%) compared to package areas (8.55%). In 6 out of 16 States, no cases of awareness were reported for these measures while of the remaining H. P. tops the list, followed by Punjab, U.P., A.P. and Mysore. In Bihar, Gujarat, M.P., Madras and Orissa, less than a tenth of the respondents reported knowledge of cultural measures. Mechanical measures were, on the other hand, known to 15.29% of the respondents—16.90% in the package and 14.28% in non-package areas. Only in two States, Maharashtra and West Bengal, there were no cases of such knowledge reported. In the remaining, the number reporting knowledge was less than 10%.

5.7 The knowledge regarding the above two types of measures was relevant for all the three stages of crop. In the descending order of the proportion of respondents reporting knowledge of these measures, storage, sowing and standing crops were reported for mechanical measures while for cultural measures the order was sowing, standing crops and storage stages. The main agency responsible for imparting knowledge for both these control measures at various stages of the crop was 'others'. The role of the governmental agencies for these control measures was very insignificant unlike for chemical control, while the part played by private institutional agencies was practically nil. Many of the cultural and mechanical measures were known traditionally to the progressive farmers as a part of the usual agricultural operations, and hence they seem to be the main extension agents in this respect. However, the general awareness of the cultivators was quite poor as above and the governmental agencies can improve the situation with a little more extension effort from their side also.

(B) *Knowledge of curative Plant Protection Measures* :

Chemical Control Measures :

5.8 The level of knowledge regarding the curative measures is generally higher than that of preventive measures. As in the case of preventive measures, for curative treatment also the chemical control measures were better known than other types. Of the sample cultivators, 40.8 per cent reported knowledge of chemical measures compared to 16.3 per cent of mechanical measures and 8.4 per cent of cultural measures. The biological control measures were not yet well known and less than half per cent of the cultivators reported awareness of such measures for sugarcane and paddy crops only. Kerala, with 94 per cent of the cultivators aware of chemical curative measures load the list followed by Bihar, West Bengal,

Mysore and Andhra Pradesh reporting 50 to 60 per cent of the respondents reporting knowledge. Between 40 to 50% of the respondents reported knowledge of these measures in Himachal Pradesh, Punjab, Madras, J. & K., Assam and Rajasthan, while the proportion was less than two fifths in Gujarat (29%), M.P. (25%), Orissa (27%), U.P. (19%) and Maharashtra (10%). In this context it is interesting to observe that in all the States a large proportion of cultivators were aware of the chemical control for curative measures compared to preventive measures except in the States of Maharashtra, U.P., Punjab and H.P. In 7 out of 15 States, the level of knowledge of these measures was better in non-package areas compared to package areas and this is possible due to the initial nature of the IADP at the time of this study. For details, appendix table 5.3 may be seen. The summary table below gives the proportion of respondents reporting knowledge of curative chemical measures according to the stage of the crop :

5·11 *Percentage of respondents reporting knowledge of curative chemical measures among the respondents reporting awareness of one or the other of the Curative Plant Protection Measures*

Area	Stages of Crop					
	Storage	Sowing	Standing crop	Storage & sowing	Sowing & standing crop	Storage & standing crop
1	2	3	4	5	6	7
Package	1·6	17·2	97·8	..	20·9	2·5
Non-package . .	11·5	4·9	93·3	0·22	3·5	5·5
All areas . . .	7·3	10·0	95·2	0·13	8·8	4·3

5.9 The knowledge regarding the curative plant protection measures was mainly for the standing crop stage where the attack of pests/diseases could be noticed and the chemical measures taken to control this. At the storage and sowing stages these measures were known to a small extent only. The knowledge was also mainly acquired after the year 1955-56 in the case of standing crops and sowing stages while for the storage this knowledge was equally well known before this year also. However, the main agencies through which this knowledge was obtained were the governmental and 'other' agencies as in the case of preventive measures. The role of the private and institutional agencies was quite limited.

Other curative measures :

5.10 The mechanical curative measures were known to 16.3% of the respondents in the package and non-package areas. The knowledge of these measures was reported from all the States except for Maharashtra and West Bengal while the reported level of knowledge was less than 5% of the respondents in Assam, Bihar, J. & K., Rajasthan and U.P. Of the other States, Kerala came first with 77% of the cultivators having knowledge of these measures, followed by M.P., Madras, A.P., Gujarat, Orissa and Mysore. Curative measures appeared to be less important excepting in States like J. & K. which lead with 90% of the cultivators having some

knowledge followed by U.P. (30%) and A.P. (24%). Such knowledge was also limited to standing crops, (for 59% of the cases) and sowing stages (for 40.4% of cases).

5.11 The above aspects regarding knowledge of Plant Protection measures may be broadly examined with reference to the three important food crops, *i.e.*, paddy, wheat and jowar

The preventive chemical measures were known to larger proportion of cultivators of wheat (42.8%) and Jowar (39%) compared to paddy (30%). But on the other hand, the Paddy growers were aware of curative chemical measures to a much larger extent (58.3%), compared to wheat (19.5%) and Jowar (9.5%), growers. A larger proportion of cultivators in the package areas reported knowledge of preventive mechanical measures for Paddy and wheat while for Jowar the proportion was less compared to non-package areas. Of the curative chemical control for all the three crops, the level of knowledge was better in non-package areas. For cultural (both preventive and curative) measures also for the above crops, the level of knowledge was better in non-package areas. The table below gives the particulars of knowledge for the three food crops in package and non-package areas :

5·III *Percentage of cultivators growing the crop having knowledge of Plant Protection Measures for the important food crops*

Particulars	Paddy			Jowar			Wheat		
	Package	Non-package	All areas	Package	Non-package	All areas	Package	Non-package	All areas
1	2	3	4	5	6	7	8	9	10
Preventive									
Chemical .	32·8	26·6	30·0	25·9	42·2	39·0	54·8	23·1	42·8
Cultural .	1·5	8·9	4·9	2·4	5·2	4·6	5·0	24·9	19·2
Mechanical	11·0	32·8	20·9	5·9	Nil.	1·2	23·0	14·9	17·2
Curative :									
Chemical .	45·7	73·5	58·3	4·7	10·6	9·5	10·6	23·1	19·5
Cultural .	5·9	11·3	8·4	Nil	1·2	0·9	4·6	14·2	11·5
Mechanical	9·7	25·3	16·8	35·3	2·3	8·8	3·2	9·7	7·8

(C) *Adoption of Plant Protection Measures* :

Preventive Measures :

5.12 Preventive plant protection measures of one type or the other were taken up by 9.3 per cent of the cultivators growing the crop in the year 1961-62. This proportion was higher in package areas at 11.7 per

cent compared to 7.4 per cent in the non-package areas. No adoption was reported from Assam, Orissa and Rajasthan while the adoption was less than 5 per cent among the cultivators in 9 other States. Of the remaining 4 States, the adoption was limited to package areas only in Jammu and Kashmir and Kerala to the extent of 86 per cent and 41.6 per cent, respectively, among the relevant cultivators. In A.P. 33.7 per cent of the cultivators adopted preventive measures, the proportion being 18 per cent in package areas and 42.4 per cent in non-package areas. In Mysore State 23.9 per cent of the cultivators reported adopitng the measures, made up of 37.8 per cent of package cultivators and 16.3 per cent of non-package cultivators (Appendix Table 5.5). Of the cultivators adopting the measures in 1961-62, 52 per cent of them were adopting the measures for the first time in 1961-62 while the remaining 48 per cent adopted these measures earlier and continued during the year under reference. The table below gives the percentage of cultivators adopting the measures according to the year of first adoption:

5·IV *Percentage distribution of cultivators adopting preventive measures in 1961-62 by year of first adoption*

	Year of first adoption	Package areas	Non-package areas	All areas
	1	2	3	4
Before	1955-56	5·9	4·8	5·9
	1955-56	1·3	2·5	1·8
	1956-57	2·7	4·2	3·3
	1957-58	2·0	6·7	4·1
	1958-59	9·3	2·5	6·3
	1959-60	12·6	8·3	10·7
	1960-61	17·9	13·3	15·6
	1961-62	48·3	56·7	52·0
	TOTAL	100·0	100·0	100·0

5.13 The adoption of preventive measures was not in all cases the recommended measures and in many areas local traditional measures were also in vogue. About 68 per cent of the adopting cultivators reported taking recommended measures and this proportion was higher in package areas (about 95 per cent). In all the States in the package areas, the recommended measures were adopted by 90 per cent of cultivators while only in A.P., the adoption of recommended measures was very low (5.13 per cent among the adopting) in the non-package areas, dragging down the proportion for all-State non-package ratio. Among those adopting the preventive measures, in the non-package areas chemical measures (29.1 per cent) and cultural measures (72.4 per cent) were reported for adoption while in

package areas all the four types of measures were reported (Appendix Table 5.6). The Summary table below gives the break-up of adoption by types of measures taken for the four States and all States :

5·V *Percentage of respondents taking preventive Plant Production Measures and by types of such measures*

State/area	Percentage of cultivators taking any P.P. measures	Percentage of respondents taking measures by types of measures			
		Chemical	Cultural	Mechanical	Biological
1	2	3	4	5	6
(1) *Andhra Pradesh*					
Package	18·0	53·3	46·7	..	..
Non-package	42·2	6·1	95·1	..	..
All areas	33·7	18·8	82·1	..	..
(2) *Jammu and Kashmir*					
Package	86·0	16·3	..	100·0	..
(3) *Kerala*					
Package	41·6	85·3	5·9	8·8	..
(4) *Mysore*					
Package	37·8	7·1	90·5	..	9·5
Non-package	16·3	100·0	..	..	..
All areas	23·9	44·3	54·3	..	5·7
(5) *All States*					
Package	11·7	35·2	29·6	28·0	2·8
Non-package	7·4	29·1	72·4	..	..
All areas	9·3	32·6	53·5	16·1	1·6

5.14 Roughly nine-tenths of cultivators were not adopting preventive plant protection measures and the reasons for such non-adoption were ascertained from the respondents. 80 per cent of the non adopters reported lack of knowledge or guidance for adopting the measure. The other important reasons reported for non-adoption were lack of conviction regarding the utility (2.76 per cent), non-adopting by other cultivators (4.41 per cent) and other reasons related to climatic, physical and financial situations. Of the four States where a significant proportion were adopting the measures, the main reasons given by non-adopters relate to lack of knowledge and guidance—to the extent of 93 per cent in J & K., 50 per cent in A.P., 51 per cent in Kerala and 88 per cent in Mysore. In Assam, Orissa and Rajasthan where no cases of adoption were reported, about 98 per cent of the cultivaters reported lack of knowledge and guidance for non-adoption. Of the other States where the adoption was less than 5 per cent, the main reasons for non-adoption were varied even though the main reason was lack of knowledge and guidance in all of them. The other important reasons, besides the above, were non-adoption or lack of cooperation from other cultivators and lack of conviction regarding the utility of the measures. Thus, the main reason for non-adoption in almost all the States could be traced to lack of sufficient extension efforts in the areas. For details regarding the reasons, appendix table No. 5.7 may be referred.

5.15. The proportion of cultivators adopting the preventive plant protection measures for the three important food crops was to the extent of 13 per cent for paddy, 1.5 per cent for Jowar and 1.1 per cent for wheat. For paddy, more than 65 per cent of the adopting cultivators reported taking cultural measures and about a third, of chemical measures. In the case of Jowar and Wheat, more than 90 per cent of the adopting cultivators reported taking only cultural measures. The adoption was more or less of the same order for these three crops in both the package and non-package areas. In the case of groundnut, one of the important cash crops, the adoption of preventive measures was reported to the extent of 10.5 per cent of the cultivators growing the crop and limited to package areas only and consisting of mainly cultural practices to the extent of 95 per cent of adopting cultivators. Even though the level of knowledge of preventive plant protection measures was higher for Jowar and Wheat, the actual adoption for these two crops was much less compared to Paddy. Among the reasons given for non-adoption, a higher proportion of cultivators growing these two crops reported lack of guidance for adoption compared to Paddy. On the other hand, lack of knowledge for adoption was of the same level for all the three crops. Thus, the lesser adoption of preventive measures was to a certain extent due to less efforts of the functionaries at the village level to cover those crops under the measures. It is also important to note in this context that it is difficult to demonstrate the effectiveness of preventive measures and the additional cost involved in taking these measures does not appeal easily to the cultivators. On the other hand, for curative measures there is relatively more awareness, the cultivators being anxious to save the crops which will otherwise be destroyed. (Appendix Tables 5.6 and 5.7).

(D) *Adoption of Curative Plant Protection Measures* :

Extent of Adoption :

5.16 The adoption of curative plant protection measures is relevant only in cases where the pests/diseases are noticed and the control measures taken to arrest further spread and damage to crops. Pests/diseases were reported to have been noticed in 61.8 per cent of the cultivators' fields in 1961-62. Out of these in 29 per cent of the cases, curative plant protection measures were taken including 21.4 per cent of them being the recommended measures. More than 90 per cent of the measures were taken at proper time. Of the package and non-package areas, the attack of pests/diseases was less in the former (52.0 per cent of the cases) compared to the villages in the non-package areas (68.1 per cent) and adoption of measures was also higher to the extent of 33.4 per cent in package villages compared to 26.9 per cent in non-package villages for the relevant cultivators. The package area also reported a larger proportion taking up recommended measures compared to non-package areas. (Appendix Table 5.8).

5.17 Among the States the highest adoption to the extent of 90 per cent of relevant cultivators was reported from Kerala. Six States reported adoption by more than a third but less than half the relevant cultivators and these were A.P., Madras, Mysore, J. & K., Punjab and U.P. In West Bengal also 13.8 per cent of the cultivators reported adoption of the measures while the only State not reporting any cases of adoption

was Bihar. In the remaining 7 States the adoption was by less than a tenth of the relevant cultivators. The adoption of curative measures was more or less localised in a few States for some of the crops as in Kerala where 88.4 per cent coverage of coconut and 71.4 per cent coverage for vegetables and fruits and Arecanut was reported, while in Mysore and Orissa 100 per cent coverage of fruits and vegetables was reported. Thus the adoption of curative measures for coconut, arecanut and fruits and vegetables stood the highest at 88.4 per cent, 75 per cent and 75 per cent respectively. This is also due to the fact that plantation crops are covered under special schemes both for preventive and curative purposes. Such schemes operate on an area coverage basis irrespective of the individual initiative. Of the regular crops, adoption was highest for Paddy (30.3 per cent) with significant level of adoption in about 10 out of 16 States. In the case of Jowar the adoption was obtained only in Gujarat and Rajasthan wholly in the package areas with the overall adoption of less than 1 per cent. For Wheat also, the adoption of curative measures was limited to U.P. only (63.7 per cent) while in M.P. and Rajasthan the figures are not significant, with overall relevant coverage of upto 20 per cent. Of the cash crops also, the curative measures covered to the extent of 21.3 per cent of the relevant cultivators for sugarcane and 3.8 per cent for groundnut. [Appendix Table 5.8(A)].

5.18 For the period from 1955-56 to 1961-62, yearwise, the number of respondents adopting curative measures for the first time was ascertained. Proportionally, about half the relevant cultivators adopted measures in the earlier two years in J. & K., Kerala, Mysore and U.P. in the middle two years by Rajasthan and West Bengal, while the remaining 8 States having significant proportion adopted the measures during the last two years of the reference period. In Bihar, no cases of adoption were reported while in H.P. only two cases of adoption out of 100 cultivators, were reported and hence excluded from subsequent tabulations. (See appendix table 5.9). Of the above cultivators adopting the measures for the first time during the reference period, more than 70 per cent took chemical measures, while cultural and mechanical measures were taken up by a fifth of the cultivators. The biological measures were reported to have been taken, in all, by about 1 per cent of the adopting cultivators limited to Mysore State only in the package areas. (In Mandya District there is an ontomology laboratory functioning for over a decade. Natural enemies for some of the sugarcane pests are evolved in this centre). Relatively, a higher proportion of respondents adopted chemical measures in non-package areas while the other two types of measures were adopted by large proportion in the package areas. Chemical control measures were more popular than the other measures in the States except in J. & K., U.P., and H.P. Cultural measures were more popular in the first two States while in M.P. mechanical measures were equally popular as the chemical measures.

5.19 It will be interesting to observe the nature of help received by the adopting cultivators for adoption for the first time and for actual measures taken during the year 1961-62. Upto about 70 per cent of the adopting cultivators did not give any reply regarding the nature of assistance received. For the remaining, the table below gives the percentage distribution of adopting cultivators by types of help received :

5·VI Percentage distribution of adopting cultivators by type of help received

Type of help received	Percentage distribution of respondents adopting measures					
	For the first time			for 1961-62		
	Package	Non-package	All areas	Package	Non-package	All areas
1	2	3	4	5	6	7
1. No. help received	18·5	12·5	15·1	9·4	10·3	9·9
2. Free supply of Pesticides	31·5	51·1	42·9	35·7	40·5	38·3
3. Free supply of equipment	5·4	7·9	6·9	10·5	4·7	7·4
4. Concessional supply of Pesticides	..	..	..	1·0	1·8	1·4
5. Concessional Supply of Equipment	..	3·9	2·3	3·1	23·5	13·9
6. Subsidised pesticides	2·2	1·6	1·8	2·1	0·0	0·9
7. Equipment on rent	6·5	2·4	4·1	14·7	4·7	9·4
8. Guidance from VLW	9·9	1·6	5·0	8·4	0·0	3·9
9. Guidance from others	4·3	13·4	9·6	6·3	14·0	10·3
10. Free supply of Equipment and service	...	..	..	1·0	0·0	0·4
11. Free supply of materials and service	1·1	2·4	1·8	0·0	0·9	0·4
12. Free supply of Equipment and material	7·6	2·4	4·6	2·1	0·0	0·9
13. Free supply of material equipment & service	13·0	0·8	5·9	10·5	0·9	5·4
TOTAL per cent reporting).	37·6	29·1	32·2	37·8	25·4	30·1

5.20 About 71 per cent cultivators did not take curative measures even though pests/diseases were noticed in the fields as noted earlier. This proportion was higher at 73 per cent in non-package areas compared to package areas (66 per cent). Lack of knowledge was reported in 83.9 per cent of the cases and this proportion was less in package areas (65 per cent) compared to non-package areas (94 per cent). The other important reasons for non-adoption were lack of conviction (7.8 per cent) and non adoption by other cultivators (4.5 per cent). For these two reasons

the proportion was relatively higher in package areas besides lack of supplies, lack of funds and expert labour. It is interesting in this context to analyse the data regarding reasons given, according to the size of cultivation holdings of the non-adoptors. For example, regarding lack of knowledge, the proportion reporting the reason decreased with increase in the size of the cultivation holding in package areas, while the reverse trend is observed in non-package areas. Also, with lack of conviction in the efficacy of plant protection measures, the proportion reporting this reason indicated a decreasing trend with increase in cultivation holdings except in the case of medium size cultivators who reported this reason in the largest proportion in both package and non-package areas. For other reasons and for individual crops the appendix table No. 5.10 may be referred.

5.21 The extent of adoption of the preventive and curative plant protection measures among the selected respondents in the VLW headquarters villages and other villages is presented in the appendix table 5.11. In terms of the gross cropped area of the selected respondents covered under the preventive and curative plant protection measures data are presented in the appendix table (5.12). It is evident from this table that a larger proportion of the area was covered under curative measures (6.59 per cent) compared to the area covered under preventive measures (5.76 per cent). The proportionate area coverage was larger for both these measures in the package areas compared to non-package areas. For detail State-wise and for important crops the appendix table may be referred.

Adoption of specific plant protection measures :

(E) *Seed Treatment* :

Extent of Adoption :

5.22 Seed treatment is probably the cheapest but effective measure in preventing some pests/diseases at later stages of crop growth. Of the cultivators in our sample, 28 per cent reported attending to seed treatment. This proportion increased with increase in the cultivation holding from a mere 22.8 per cent of cultivators in the lowest holding size group to 60.1 per cent, in the highest size group. A larger proportion (29.2 per cent) were observed to attend to seed treatment in the non-package areas compared to package areas (26.0 per cent). But of these adopting the measure, a larger proportion adopted the same for the first time, earlier in package areas compared to non-package areas where such adoption was in latter years. One interesting trend observed in this context was that the proportion adopting the measures among the lower cultivators size group was higher in non-package areas while in package areas such concentration was among the bigger cultivators.

5.23 Of the cultivators growing important crops, the adoption of seed treatment was the highest for wheat (34.89 per cent), followed by groundnut (30.0 per cent), Paddy (18.47 per cent) and lastly for Jowar (10.48 per cent). The proportion attending to seed treatment was higher in package areas compared to non-package areas for all the crops except paddy. This was particularly more in the case of Jowar for which the adoption was upto 35.14 per cent of cultivators in package areas compared to a mere 3.94 per cent in the non-package areas. The proportion of cultivators adopting the measure increased with the increased size of holding in the case

of wheat and groundnut while in the case of Jowar the reverse trend was observed and for paddy there was no marked difference in proportions with the size holdings. Regarding the year of first adoption, the proportion adopting the measures earlier to 1955-56 was higher in the case of Jowar (21.62 per cent), compared to paddy (10.83 per cent), groundnut (8.09 per cent), and wheat (5.50 per cent). Conversely, the proportion adopting the measures for the first time during 1961-62 was higher for paddy compared to other crops while for wheat and groundnut the larger proportion was observed for the period 1955-56 to 1960-61. Between the package and non-package areas, for various crops earlier adoption for a larger proportion in package areas was observed generally in the case of paddy, groundnut and Jowar while for wheat the reverse situation was noticed (Appendix Table 5.13).

5.24 In the case of cultivators adopting seed treatment the type of treatment done for the first adoption during the period upto 1960-61 was ascertained. The types of seed treatment in vogue were grouped under four types—Type I and Type II involving respectively treatment and treatment with salt water, Type III involving chemical treatment and type IV included under the same all other residual treatments. Type I and II treatments were reported by more than two third of the adopting cultivators while type IV was adopted by about a fifth of such cultivators. The chemical treatment was taken up by only 2.1 per cent of the adopting cultivators and this proportion was higher in package areas (5.2 per cent) compared to non-package areas (0.5 per cent) (Appendix 5.14). Out of the total respondents, 10.53 per cent reported using one type of chemical or the other for seed treatment during 1961-62. This proportion was slightly higher in the package areas (11.03 per cent) compared to non-package areas (10.22 per cent). This shows that the most effective measure of seed treatment *viz.* chemical was yet to reach a large number of cultivators. In this context it has also to be noted that the first two types of treatment are some what traditional and hence known to larger number of cultivators. The chemicals popular for seed treatment in the order were Agrosan, B.H.C., Gemmexine and Sulphur. Of the cultivators using the chemicals for seed treatment, 86.93 per cent reported the chemicals effective and this proportion was higher in non-package areas (88.55 per cent) compared to package areas (84.54 per cent). The largest proportion reporting ineffectiveness of chemicals obtained by purchase in all the areas while the level of effectiveness was better in the case of chemicals obtained free or on subsidy mainly from departmental and institutional agencies. (Table 4.III).

Non-adopters and reasons for non-adoption :

5.25 A large proportion of respondents were not undertaking any type of seed treatment as noted earlier. The reasons for such non-adoption were varied, but the most important reason was lack of knowledge followed by lack of guidance to take up the measures. Thus, 76.85 per cent of the non-adoptors reported lack of knowledge and this proportion was more in non-package areas (81.78) compared to that in package areas (69.1 per cent). Cropwise, the proportion lacking knowledge was more in the case of paddy (79.12 per cent) and Groundnut (83.23 per cent) compared to Jowar and Wheat (65 to 66 per cent). Lack of guidance was reported by 5.39 per cent of the non-adopters though the position was relatively

better in package areas (2.38 per cent) compared to non-package (7.30 per cent). The other important reasons for not taking up seed treatment were lack of conviction (5.17 per cent) and non-adoption by others (4.63 per cent). About a fifth of the non-adopting cultivators, however, reported obtaining treated seed from the department and hence there was no necessity for them to take up the measures. For details regarding cropwise reasons and size groupwise, appendix table 5.15 may please be referred.

(F) *Treatment of Standing crops* :

5.26 The adoption of plant protection measures for standing crop was earlier covered under knowledge and adoption in this chapter itself. Of the chemicals used for standing crops, the more popular were Endrix (25.73 per cent), DDT (21.24 per cent), B.H.C. (21.07 per cent) and Gemmaxine (10.19 per cent) while a smaller proportion of the cultivators reported using Bordoaux Mixture (7.43 per cent), Folidol (5.70 per cent) etc. Of the cultivators obtaining chemicals, 48.1 per cent obtained their requirements from private agency while the share of departmental and cooperative supplies was 27.4 per cent and 17.6 per cent respectively. The departmental and cooperative agencies handled larger proportion of stocks in the package areas compared to private agencies while the private agencies role was important in the non-package areas (Table 4.1). Of the persons reporting supplies of chemicals, 82.8 per cent reported full cash payment as against 12.6 per cent reporting obtaining subsidised supplies, and 4.6 per cent of free supplies. The supplies, free and on subsidy, were obtained by a larger proportion of persons in the package areas compared to non-package areas (Table 4.V).

(G) *Rat Control Measures* :

5.27 Rat control measures were mainly relevant for cultivators reporting rats menace in the fields. Of the total cultivators in the sample 58.2 per cent reported rat menace in the fields and about a third of them (34.8 per cent) were taking measures to control the menace. In 7 States *i.e.* Assam, Bihar, Gujarat, Maharashtra, Orissa, Himachal Pradesh and West Bengal, the control measures were not taken by any significant proportion of the cultivators. In the package areas, the menace was reported by less proportion of cultivators (53.2 per cent) and a large proportion (49.0 per cent of them reporting menace) attended to the control measures compared to non-package areas. In the non-package areas 61.1 per cent of the cultivators reported the menace but only 26.9 per cent of them took the measures. According to size group of cultivation holding there was no appreciable trend observable in adoption even though in the package areas the adoption of the measures for the relevant cultivators was higher in the lower land size groups to some extent. Of the persons taking the measures, about half of them first adopted the same earlier than 1955-56 and this proportion was higher (55.0 per cent) in package areas compared to non-package areas (43.9 per cent). In the subsequent years the level of adoption was higher in the later years for the non-package areas. (Appendix Table 5.16).

5.28 Of the cultivators adopting the measures, 96.57 per cent reported taking the measures in time. These measures were to be taken regularly

every year and 84.57 per cent of the cultivators reported taking the measures with such regularity. However, this percentage was more in package areas (91.62 per cent) compared to non-package areas (77.39 per cent). The rat control measures mainly consist of physical and the chemical measures. Of the adopting cultivators about two-fifths were adopting physical measures and three-fifths, chemical measures. The physical control measures were popular only in A.P., J. & K., and Madras while in Mysore both type of measures were equally popular and in the remaining States the chemical measures were predominantly followed. (Table 5.17). Of the chemicals used Zink Phosphide was the most important chemical used to the extent of 89 per cent of the cultivators. Private traders were the main agency for supply of rodenticides accounting for 50.49 per cent of the cultivators using the same and the next important source was the departmental or block agency with 36.32 per cent of the cultivators. However, in the package areas the block and departmental agencies catered to a larger proportion of the cultivators' needs (46.21 per cent) compared to non-package areas. (36.22 per cent) (Table 4.1). The supply of rodenticides was mainly on cash payment to the extent of 70.91 per cent of the cultivators using the same, while free supply was obtained by 27.59 per cent of the cultivators and this proportion was higher in package areas (38.29 per cent) compared to non-package areas. Subsidised supply was reported by only 1.51 per cent of the cultivators. One serious field limitation to data collection on subsidised supply was that many a times the cultivators did not know whether a particular item was being sold on subsidy basis. This fact has to be recognised in interpreting this data.

5.29 81 per cent of the respondents using the chemicals reported that the chemicals supplied were effective and the level of such effectiveness was the same in both package and non-package areas. However, the level of effectiveness was more in the case of free and subsidised supplies than the supplies purchased on cash and the source of cash purchases was mainly private trader. (Table 4.III). As in the case of the other two specific plant protection measures, lack of knowledge and guidance were the main reasons reported for non-adoption of rat control measures by the cultivators to the extent of 47.81 per cent and 7.81 per cent respectively. In the package areas relatively larger proportion of respondents reported lack of knowledge but lesser proportion due to lack of guidance compared to non-package areas. The other important reason was reported to be the harmful effects of rodenticides to the crops (13.41 per cent). Elimination of rat menace requires cooperation from all the neighbouring cultivators and such lack of cooperation was also reported by 10.54 per cent of the non-adopters. The other important reasons for non-adoption were linked supplies (8.31 per cent), lack of supplies (4.41 per cent), inaccessability of supplies (3.21 per cent) and lack of conviction (2.31 per cent). For details Statewise regarding reasons for non-adoption, Table 5.18 may be referred.

CHAPTER VI

Summary of Findings and Suggestions

6.1 Crop pests and diseases cause considerable damage to the seasonal crops and plantations. In the context of persistent food shortage *vis-a-vis* the increasing demand and the need for larger exports, it is imperative that these losses are reduced to the minimum by laying greater emphasis on plant protection measures.

6.2 Hope for the success of the programme lies in the sphere of individual farmer at whose level the implementation of the programme has certain implications. Firstly, some of the measures, like rat control, weed control, application of pesticides against locust attack, lose their value unless adopted on community basis. Secondly, measures have to be adopted on a continuing basis to ensure the benefits once realised. Thirdly, operation at farmer's level implies organisation of supplies and extension efforts on a very large scale.

6.3 Plant protection measures can be broadly classified into four groups *viz.* (1) chemical control, (2) mechanical and physical control, (3) cultural control, and (4) biological control. Plant protection on the modern lines was introduced in India in early forties. However, it is only after 1947 and particularly since the inception of development planning in India that the plant protection machinery as an integral part of the Department of Agricultute was also strengthened. The village level workers, who are to extend knowledge and the adoption of improved practices at the village level, are being trained in plant protection work. By the end of Second Plan period, considerable improvement was made in the organisational structure for plant protection. During the Third Plan there were two important developments on the organisational side, *viz.* greater emphasis was laid in the package areas with the provision of extra staff for the purpose of plant protection measures and the involvement of the Panchayats and the Cooperatives in pushing forward the programme.

6.4 During the Plan periods there was considerable progress in respect of crop area covered by the plant protection measures as well as in the consumption of pesticides. In the field of biological measures a beginning has been made, during the Second and Third Plan periods. In the field of distribution of pesticides in the first two Plans, subsidy on the sale of pesticides and manually operated equipment was given only for treating food crops. In the Third Plan subsidy was extended to the treatment of all crops. Aerial operations with government or private aircraft were heavily subsidised during the years 1962 and 1963 for treating cotton and groundnut crops.

6.5 Ten States have got regular Pests and Diseases Act and in majority of these States, the Act was passed during the decade 1950-60. In two States, namely, West Bengal and Himachal Pradesh, there was no regular enactment to deal with the pests and diseases. Though the enabling legislation exists in most of the States, it was reported that most of the States have not enforced the Act in spite of outbreak of disease and pests.

Instead, the State Governments depended on persuasion and material inducements. As regards enforcement of Act, some practical problems were experienced.

Planning Process :

6.6 With the advent of planning and the C.D. movement there was greater emphasis on strengthening of the agricultural extension staff, with provisions for equipment and pesticides. Even for the second plan period in many of the States targets were not fixed on the plea that the measures were contingent on the outbreak of pests/diseases, mainly.

6.7 Among the States where the targets were fixed, these were fixed on very broad lines mainly based on past performance, availability of funds, equipment, pesticides and staff rather than on the basis of the requirements of the area. The funds provided fell so far short of the need that detailed planning was not considered worthwhile. For the third Plan, however, practically all the States decided upon covering a certain percentage of the gross cropped area. But these overall targets were not broken up cropwise nor was there any indication of the preventive and curative measures. In most of the States the exercise in planning was one from above. Even where preparation of plans in advance was reported, the main feature was that they were not based on scientific surveys. It was the considered opinion of the officers in charge of the programmes that plant protection has not been given the due priority and the importance it deserved.

6.8 Coordination between various official agencies was reported to be satisfactory for the locust control operations. In respect of regular plant protection work, however, the role of agencies other than the Agriculture Department has been quite negligible. The participation of the village institutions, *viz.* the Cooperative and the panchayats was observed to be not very satisfactory.

6.9 The Regional units under the Directorate of Plant Protection and Quarantine of the Government of India were set up with necessary materials and equipments. But it was observed that these units are thinly spead out and area covered by each unit was too large to make them effective and useful.

Administrative set-up :

6.10 In many of hte States, officers exclusively in charge of plant protection work were posted at the State level. In addition to this, in almost all States, specialists like Mycologists, Entomologists, Pathologists are associated with the plant protection programme. In Assam, Gujarat, Madras and West Bangal, however, there were no exclusive officers for plant protection work at State level.

6.11 At the divisional level, plant protection officers were stationed covering a group of contiguous districts assisted by plant protection assistants or agricultural supervisors, for arranging prompt supplies, organising training programme and also provide guidance and coordination for the regular agricultural extension staff. They were also required to mobilise personnel and material in times of emergency of large scale pest/disease

attack. However, the other plant protection staff at the district level were found in a large number of cases not better informed than the regular extension staff regarding plant protection.

6.12 There was no separate set-up at block level for plant protection work. In majority of the States, the situation at this vital operational level appears to be far from satisfactory. At the village level, this is one of the many functions of the V.L.W., a multipurpose worker. The training provided for the Block extension staff including the V.L.Ws. was not only inadequate, but also limited mainly to the operational aspects of plant protection rather than the technical aspects.

Research :

6.13 Research stations exclusively for plant protection work existed only in Punjab while in other States the usual agricultural research stations attended to this aspect also. Only in Mysore and Punjab such arrangements existed upto the district level while in other States the Research Stations were organised mainly on regional basis. The research carried out in these stations in almost all the States was mainly problem-oriented according to the felt-needs of the area.

6.14 The results of fundamental research are published in technical and departmental journals. In the case of applied research the results are communicated to the extension staff and wide publicity is given through press, pamphlets and personal contacts. Considerable time lag was reported for the results to reach the cultivators as the Research stations do not have their own extension staff in the field. Arrangements for research on plant protection did not exist at different levels in many of the States. These stations were in general, organised at the most on regional basis to cover the crop tracts or tracts based on soils, irrigation etc. The intensity of research, of course, differs from a mere efficacy trials as in Gujarat and Maharashtra to a systematic efforts for identification, classification and preparation of catalogues of the insects of the State as in Bihar.

Extension :

6.15 The extension agencies involved in popularising plant protection measures are the department of agriculture, the block agency and the private manufacturers. The associate organisations have not yet actively taken up propaganda except in one block in Mysore State, where the farmer's forum was reported to have been issuing regular bulletins containing information on pests/diseases.

6.16 The methods of extension included distribution of literature, filmshows, exhibition, educational tours, personal contacts and group discussions, demonstrations and organising special campaigns. The most effective method among them was demonstration. Many States reported inadequate extension efforts, while some of the methods were not taken seriously neither by the cultivators nor extension staff. More than four fifths of the sample villages reported inadequate extension efforts for plant protection measures.

6.17 The inadequacy of extension efforts is also reflected in the responses of the cultivators. Only 13.2 of sample respondents reported first preference for plant protection while 13% of the respondents reported

buying the materials on their own without waiting for outside help. Thus, plant protection measures were mainly treated as a departmental programme by the cultivators and the awareness to take up the measures individually or on a community basis to prevent the damage to crops was not so much in evidence.

6.18 The number of demonstrations held works out to about one for ten villages and this ratio is much lower for the non-package villages. Of the different types of demonstrations, method demonstrations accounted for about 70% while a fifth were of composite type. The main agency to organise demonstrations at the village level was the V.L.W. under the supervision and guidance of the departmental and block extension staff.

6.19 The cultivators got their training in plant protection during village leaders' training camps and lack of sufficient number of plant protection staff was in the way of intensifying the training programme for cultivators. The training programme for the extension staff was reported to be not satisfactory in many States. The extension staff lacked precise knowledge regarding the pests/diseases and the measures to be taken against them. This reduced the extension work to a routine perfunctory affair.

Supply arrangements for Plant Protection Material :

6.20 The plant protection chemicals are generally selected for canvassing adoption after regular laboratory and field tests. The supplies are arranged in all the States through private manufacturers or formulators. In some States like Mysore, Maharashtra and Gujarat, the Cooperatives are also given the agencies of the private manufacturers for distribution. In most of the States, arrangements exist for stocking the chemicals at the district level.

6.21 The supply arrangements at the village level appeared to be far from satisfactory. Of the sampled villages, only about 27% had the supply depots of one agency or the other located within the village. Regarding agency-wise supplies and location of depots, more than half the cultivator households reporting plant protection measures, had obtained their requirements of chemicals from the private agencies. However, in the package area, the role of official agencies is more prominent. Out of the total selected villages having supply-depots within 5 miles distance from the village, only 16% were owned by the private agencies.

6.22 Regarding supply of equipment private manufacturers are the only source of supply in all the States. In many States, these equipments are supplied to cultivators at subsidised rates. The equipment is test checked in block offices and where necessary, supply from out side also is arranged. At the village level, the V.L.W. keeps a few sets of equipment only for demonstration purposes. Only in a very few States, the Cooperatives are dealing in the sale of equipment.

6.23 The availability of equipment at the village level was quite unsatisfactory. The role of the private agencies was quite limited in this context. Besides availability of equipment, servicing and repair of these are also important. There is need to ensure systematic and regular servicing/repair at least upto block level.

6.24 Regarding the availability of equipment, in many States it was reported to be adequate at the present level of adoption of plant protection measures. The position regarding the timeliness of supplies remained unchanged during the three years from 1960-61 to 1962-63 without appreciable improvement and roughly two-thirds of the sample villages reported timely supplies. The main reason for untimely supplies was attributed to the inadequacy of chemicals and also poor maintenance of equipment available at the village level.

6.25 Strong preferences for particular types of plant protection chemicals was not much in evidence. Sometimes the preferences were observed to be varying according to the need and the areas as in Bihar, where Agrosan was widely used but Aldrin was preferred for Rabi crops against white ants and cutworms. As regards efficacy of chemicals, there was no complaint in any of the States.

6.26 Subsidy on the supply of plant protection materials is available in all States except in U.P. where 33% subsidy was allowed on agricultural implements including plant protection equipment. The pattern of subsidy varied from State to State and even within the State, the quantum of subsidy also differed from scheme to scheme. It is interesting to note that the chemicals were mainly purchased on cash without any subsidy in a large number of cases for rodenticides and for standing crops. Supply of chemical freely or on subsidy was available to about 90% of the cultivators for seed treatment while this proportion was about 18% for measures on standing crops and about 30% for eradication of rodents.

6.27 Plant protection equipment was made available by the department and village institutions in many of the States free of charge or on nominal rates of rent. Hire-purchase system of acquiring equipment was not yet popular in any of the areas.

Knowledge and adoption of plant protection measures :

6.28 Of the various prophylactic measures, the chemical control measures were better known than the other types. Among the total sample respondents about 30% had the knowledge of chemical measures compared to about 15% and 10% of them reporting knowledge of mechanical and cultural methods respectively for one stage or the other—storage to standing of the crops. This level of awareness of the chemical measures was higher in the package villages at 34.62% of the cultivators, compared to non-package villages (26.11%).

6.29 The extension efforts are primarily aimed for the sowing and standing crop stages and consequently the proportion of respondents reporting knowledge for these two stages was higher. The principal agencies responsible for spreading knowledge of these preventive measures were governmental agencies and 'others', while the private agencies accounted for less than 1% of the respondents under sowing and standing crop stages.

6.30 The general awareness of cultural and mechanical measures was very low mainly due to inadequate extension efforts. The level of knowledge in this respect was not appreciably different in the package areas compared to non-package and in quite a few cases the package areas lagged behind.

6.31 The knowledge regarding curative chemical measures was reported by a larger proportion of sample cultivators (40.8%) compared to mechanical (16.3%) and cultural measures (8.47%). In 8 out of 15 States, the level of knowledge of these measures was better in package areas than in non-package areas.

6.32 These aspects of knowledge were examined with reference to three important food crops, *i.e.* Paddy, wheat and Jowar. The preventive chemical measures were known to larger proportion of wheat growers (42.8%) and Jowar (39%) compared to Paddy (30%). As between the categories of districts, larger proportion of cultivators from package areas reported knowledge of preventive chemical measures for Paddy and Wheat, while for Jowar the proportion was less compared to non-package areas. The curative chemical measures for all these crops were known to larger proportions in non-package areas compared to package areas.

6.33 Preventive plant protection measures of one type or the other were taken up by less than one-tenth of the sample cultivators growing the crops in 1961-62. This proportion was higher in package areas (11.7%) compared to 7.4% in the non-package areas.

6.34 Roughly, nine-tenths of the cultivators were not adopting preventive measures and the reasons for this non-adoption were lack of knowledge or guidance for about 80% of the non-adopters. The next important reason was lack of conviction regarding the utility of the measures reported by about 3% of the non-adopters.

6.35 The highest adoption of preventive measure was among paddy growers (13%) of whom two-thirds had adopted cultural measures and one-third taking to chemical measures. In the case of Jowar and wheat, more than 90% of adopters reported taking only cultural measures, the percentage of adopters of preventive measures for jowar and wheat being 1.6 and 1.1 respectively.

6.36 The curative measures were adopted by 30.3% of the relevant cultivators of paddy, 20% of the cultivators for wheat, 21.3% of the cultivators for sugarcane, 3.8% of the cultivators for groundnut and only less than one per cent for Jowar. The adoption of these measures was more or less intensive and localised for the crops as in the case of Kerala for coconut, fruits and vegetables and arecanut, in Mysore and Orissa for fruits and vegetables in U.P. for wheat etc. However, the level of adoption for Paddy was significant in 10 out of 15 States. The main reason for non-adoption of curative measures was reported to be lack of knowledge. The protection reporting lack of knowledge decreased with increase in the size of cultivated holding in package villages while in non-package areas no such trend was observed.

Adoption of specific plant protection measures :

6.37 *Seed treatment* : About 28% of the sample respondents adopted seed treatment and this proportion was higher in non-package areas (29.2%) compared to package areas (26.0%). The interesting trend observed in this context was that the proportion adopting the measures among the lower size-group cultivators was higher in non-package areas, while in package such concentration was among bigger cultivators.

6.38 Of the cultivators growing important crops, the adoption of seed treatment was the highest for wheat (34.89%) followed by groundnut (30.0%), Paddy (18.47%) and lastly for Jowar (10.48%). The proportion of cultivators adopting the measure increased with increase in size of holding in the case of wheat and groundnut, while in the case of Jowar the reverse trend was observed. In respect of Paddy, there was no marked differences in proportions of adopters according to the size of holdings.

6.39 A large proportion of respondents were not undertaking any type of seed treatment. The important reasons for non-adoption reported by about 76.1% of non-adopters, were lack of knowledge followed by lack of guidance to take up the measures. Cropwise, the proportion lacking knowledge was more in the case of Paddy and groundnut compared to jowar and wheat.

Rat control measures :

6.40 Of the total cultivators in the sample, 58.2% reported rat menace in the fields and about a third of them were taking measures. In half of the States (Assam, Bihar, Gujarat, Maharashtra, Orissa, Himachal Pradesh and West Benbal) the rat control mesures were not taken by any significant proportion of cultivators. Among the adopters, about 96% reported taking the measures in time and among these 84% were taking measures regularly every year. 81% of respondents using the chemicals reported that the chemicals supplied were effective. Two-fifths of the cultivators taking rat control measures reported adopting physical measures while the remaining three-fifths of chemical measures. Harmful effects of rodenticides to the standing crops was reported by 13.42% of non-adopters while lack of cooperation from other cultivators was an obstacle for 10.54% of the non-adopters.

Suggestions :

6.41 Enabling legislation exists in most of the States to control large scale attack of pests/diseases of plants. But rarely the Acts are invoked in view of the prescribed procedure being too dilatory and elaborate. The legislation needs to be modified as to make it more easily applicable for quick and timely action that is necessary to save the crops. Moreover the existing legislation in many cases is mainly restricted to tackling of outbreaks in epidemic form. Many of the plant protection measures by their very nature require community adoption for effectiveness. Therefore, the legislation should be made more comprehensive to deal with cases of a few recalcitrant cultivators obstructing or nullifying the community effects to protect the crops.

6.42 At the stage of planning, in many cases, only broad targets in terms of supplies etc. to be made was attempted on the plea that the measures to be taken depended on the extent of attack of pests and diseases. Many diseases have their cycle of occurence and some of the regions are endemic and some diseases/pests occur with sufficient regularity, year after year. The prophylactic plant protection measures including seed treatment, eradication of rodents, predatory brids, weeds etc. are all quite amenable for advance planning. With greater emphasis on plant protection under the present programme of intensive cultivation a more scientific approach

is necessary in planning plant protection programme. Also detailed working targets should be provided to tackle various aspects of the same in terms of coverage of area under various crops.

6.43 With increasing emphasis on plant protection, the demand for all types of plant protection material increased considerably. The Plant Protection Directorate at the Centre should prepare a projection of demand for different types of equipment and spare parts over the next five or ten years and arrange for their manufacture in bulk. The standardisation of these equipment ensuring quality control at production stage, pooling together of demand and procurement of supplies can be taken up with advantage by this Directorate at the Centre.

6.44 The regional units of the Directorate of Plant Protection and Quarantine were observed to be rather thinly spread out to be effective and useful. It may be necessary to review the functioning of these regional units. The technical competence available in these units to give advice or guidance does not compare well with that of the State level officers in charge of the programme nor does it appear necessary for a supply and service organisation to be run by the Centre except in such States where the State Plant Protection Organisation is still weak.

6.45 As regards administrative set-up, there is need for an exclusive officer at the State level to look after the detailed work relating to plant protection and coordinate the activities on this aspect. In States without such officers at the State level, the need for an exclusive plant protection officer, in the present context needs no emphasis. At the district level and below the plant protection staff are generally put under the administrative control of the District Agricultural Officer. These staff do not have direct links with the plant protection staff at higher levels. This has resulted to a certain extent in lack of effective communication, and relative lack of knowledge of these functionaries in Plant protection work; these staff are in no way better informed on technical aspects than the regular extension staff. Closer contacts and direct lines of communication should be established between the lower level plant protection staff with the Research Organisations on one hand and the regular plant protection establishment of higher levels on the other. Regular training programme and refresher courses should also be arranged for the benefit of these staff in the Research Stations and outside.

6.46 The facilities for research on plant protection need be increased significantly, particularly below the State level. A well directed and coordinated approach to research is necessary and should be mainly problem-oriented. This should be tackled on regional basis. The time lag reported for the research results reaching the extension staff and the actual adoption of the recommended measures in the field, should be substantially reduced by evolving appropriate channels of communication and follow-up.

6.47 Inadequate extension efforts were reported from the field from many States. Organisation of special campaigns, particularly for prophylactic measures and organisation of demonstrations on an increasing scale are suggested as these methods were reported to be most effective. The extension efforts were also reported to be less systematic in approach. It is necessary to prepare a control chart for various pests/diseases cropwise before each season and wide publicity should be given with efforts to cover the area under required measures.

6.48 In view of the multiplicity of trade brands of the same pesticides and the complementarity of the various pesticides against the pests/ diseases, the criteria for selection of the pesticides should, among other things, take into account the cost per unit of treatment also. The reasons for some of the recommended pesticides becoming popular and some others not so popular should be analysed and accordingly efforts made to stock and supply the chemicals in sufficient quantities and in time.

6.49 The pattern of subsidy differs from State to State and from scheme to scheme. There is need to integrate all the schemes so as to facilitate a more rational and firm basis for subsidised supply of plant protection material. The present level of awareness and adoption seems to warrant continuation of subsidised supplies. This facility should be extended not only for the supplies made by the institutional agencies but also for the private retail agencies in the shape of rebate on sales. Hire purchase system for supply of equipment was not yet popular and this may be tried experimentally in selected areas and to begin with the institutions such as panchayats and cooperatives may be taken up.

6.50 The analysis of household data is quite revealing regarding some of the aspects relating to extension. The level of extension effort of the official agency was quite limited regarding the cultural and mechanical methods as distinguished from chemical control measures. These measures have been quite popular among the progressive cultivators and they can be easily adopted and are within the reach of average farmer. However, the general awareness of these measures was quite poor and thus there seems to be considerable scope for better efforts on the part of the extension functionaries at the block and village levels. Our observations also revealed that there appears to be concentration of efforts on certain crops like paddy while for some other crops even though the level of knowledge was comparable to that of the former, the adoption of plant protection measures was on lesser scale due to lack of guidance and advice. This tendency to concentrate efforts on certain crops to the exclusion of some others needs to be remedied.

6.51 The approach of the extension agency at the field level as revealed by our analysis of data in the I.A.D.P. and non-I.A.D.P. villages. brings out certain aspects calling for suitable action. Broadly, the level of knowledge and adoption was higher in the package areas among the bigger cultivators while in non-package areas the reverse trend was discernible to some extent. This approach of the extension agency although may lead to larger coverage in terms of area, would not extend the benefits of the programme to larger number of cultivators. Thus, our analysis in some cases revealed adverse ratio in the package areas compared to non-package areas. Given the extension efforts, the cultivators in the smaller size Groups do not appear to lag behind the bigger ones and in fact, they may fare better. Perhaps, there is no rational for a continued approach to the so-called progressive cultivators indefinitely, although in the initial years such an approach would be quite in keeping with the philosophy and methods of extension.

APPENDIX A

LIST OF TABLES

APPENDIX TABLES

TABLE NO. 1.1

Statewise particulars of Targets and Achievements (area) during 1961-62 for all crops, covered by pant protection measures

(Area in acres)

Sl. No.	State	Area under seed treatment		Area under Plant Protection Measures		Area freed from rodents		Remarks
		Targets	Achievements	Targets	Achievements	Targets	Achievements	
1	2	3	4	5	6	7	8	9
1.	Andhra Pradesh	N.A.	2147343	2000000	608998*	N.A.	58000	*Excludes fruit trees numbering 1554444.
2.	Bihar	N.A.**	N.A.	404696	454265	N.A.	N.A.	**Treated seeds in the State are not fixed on area basis.
3.	Assam	N.A.	N.A.	N.A.	90490@	N.A.	N.A.	@Indcluded area freed from Rodents.
4.	Gujarat	Not fixed	224885	Not fixed	163548	Not fixed	25320	
5.	Kerala	Nil.	N.A.	460000	435492	Nil.	10428	
6.	Madhya Pradesh	Not fixed	450628	300000	600000	N.A.£	12518	£No separate target fixed.
7.	Madras	N.A.	N.A.	394900	421570	N.A.	29265	
8.	Maharashtra	N.A.	1491310	N.A.	656725	N.A.	N.A.	
9.	Orissa	N.A.	N.A.	@@182110	107665	N.A.	N.A.	@@Includes seed treatment also.
10.	Punjab	N.A.	N.A.	N.A.	122020	N.A.	—	
11.	Rajasthan	N.A.&	N.A.&	189000	1636000	300000	411000	& Seed treatment targets: 50,000 mds Achievement : 78369 Mds.
12.	Uttar Pradesh	1325364	421083	384455	709919	303518	963346	
13.	Mysore	N.A.	N.A.	N.A.	151200	N.A.	N.A.	
14.	Himachal Pradesh	10000	N.A.	9300	13068	60000	164890	
15.	West Bengal	N.A.	N.A.	416000	48047	Not fixed	N.A.	

TABLE NO. 1·2

Statewise particulars of financial outlay and expenditure on Plant Protection during 1961-62

Sl. No.	State	Outlay for P. P.	Expenditure on Plant Protection				Remarks
			Pesticides	Equipments	Other items	Total expenditure	
1	2	3	4	5	6	7	8
1.	Andhra Pradesh	1408000	880000	104000	N.A.	1020000	
2.	Assam	N.A.	188371*		95404	283775	*The breakup of expenditure on Pesticides and equipment not available.
3.	Bihar	3316232	1933964	566755	815517	3316232	
4.	Gujarat	N.A.	9308	35810	100716	145834	
5.	Kerala	N.A.	945540	575860	N.A.	1521400	
6.	Madras	2979000	N.A.	N.A.	N.A.	N.A.	
7.	Madhya Pradesh	800000	395000	162000	Nil.	557000	
8.	Maharashtra	500000	500000	N.A.	N.A.	500000	
9.	Orissa	278000	199000	53000	85000	337000	
10.	Punjab	380000	160000	156000	Nil	316000	
11.	Rajasthan	1049000	500000	80000	N.A.	580000	
12.	Uttar Pradesh	1788922	219878	249608	N.A.	1788922	
13.	Mysore	700000	75000	770000	115000	960000	
14.	Himachal Pradesh	184300	36400	55700	92400	184500	
15.	West Bengal	3731000	144911	978352	350594	2777857	

TABLE NO. 1·3

Crop-wise particulars of physical achievements in selected districts during 1961-62 *on different P.P. Measures*

(Area in acres)

State	District	Area covered crop-wise under P. P. and de-rating operations								
		Paddy			Wheat			Jowar		
		Seed treatment	Plant Protection Measures	De-rating	Seed treatment	Plant Protection Measures	De-rating	Seed treatment	Plant Protection Measures	De-rating
1	2	3	4	5	6	7	8	9	10	11
Andhra Pradesh .	Karimnagar	43112	39102	..	..	..	..	..	..	..
	Chittor	13073	18122	5834	..	..	..	..	..	..
Assam . . .	Cachar	N.A.	N.A.	N.A.	———	———	N.A.	———	———	———
	Goalpara	N.A.	N.A.	N.A.	———	———	N.A.	———	———	———
Bihar . . .	Muzzafarpur	1050	2100	N.A.	Nil	445	N.A.	..	..	..
	Shahabad	3000	3000	N.A.	16000	16000	N.A.	..	..	..
Gujarat . . .	Surat	N.A.	N.A.	N.A.	———	———	N.A.	———	———	———
	Bhavnagar	N.A.	N.A.	N.A.	———	———	N. A.	———	———	———
J. & K. . . .	Srinagar	Nil	285	1042	Nil	..	..	..	..	..
Kerala . . .	Trichur	289	10012	122	Nil	..	..	..	..	..
	Alleppey	4975	42335	Nil	Nil	..	..	..	..	..
Madhya Pradesh .	Chattarpur	Nil	Nil	Nil	4953	3170	1968	..	..	..
	Balaghat	N.A.	N.A.	N.A.	———	———	N.A.	———	———	———
	Mandsavur	Nil	30	Nil	201	4	2080	234	32	Nil
	Raipur	20237	8095	Nil.	..	..	..	..	..	..
Madras . . .	Thanjavur	N.A.	N.A.	N.A.	———	———	N.A.	———	———	———
	South Arcot	N.A.	N.A.	N.A.	———	———	N.A.	———	———	———
Maharashtra . .	Kolaba	1552	758	Nil	..	..	..	..	..	..
	Yeotmal	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	40000	4046	Nil
	Bhandara	65	2500	Nil	16	101	Nil	..	..	..

TABLE No. 1.3—*Contd*

State	District	Area covered crop-wise under P.P. and de-rating operations					
		Groundnut			All crops		
		Seed treatment	Plant Protection Measures	De-rating	Seed treatment	Plant Protection Measures	De-rating
1	2	12	13	14	15	16	17
Andhra Pradesh .	Karimnagar	..	..	..	43124	39305	Nil
	Chittor	2400	..	..	33706	40279	5834
Assam . . .	Cachar	N.A.	N.A.	N.A.	21	9723	Nil
	Goalpara	N.A.	N.A.	N.A.	NA.	34302	Nil
Bihar . . .	Muzzafarpur	..	..	..	1050	8787	Nil
	Shahabad	..	..	..	43200	45200	N.A.
Gujarat . . .	Surat	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	Bhavnagar	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
J. & K. . . .	Srinagar	..	..	..	Nil	132385	8907
Kerala . . .	Trichur	..	..	..	289	22391	122
	Alleppey	..	..	..	4975	57790	1030
Madhya Pradesh .	Chattarpur	..	..	..	4953	3170	1968
	Balaghat	N.A.	N.A.	N.A.	1725	960	590
	Mandsavur	6	8	Nil	896	97	2520
	Raipur	..	..	..	20237	8095	Nil
Madras . . .	Thanjavur	N.A.	N.A.	N.A.	25975	168070	36535
	South Arcot	N.A.	N.A.	N.A.	10818	450415	157
Maharashtra . .	Kolaba	..	..	..	1552	803	Nil
	Yeotmal	2000	2025	40	92000	19628	160
	Bhandara	..	..	..	81	2993	Nil

TABLE No. 1·3—*Contd.*

1	2	3	4	5	6	7	8	9	10	11
Mysore . .	Raichur	N.A.	N.A.	N.A.	——	——	N. A.	——	——	——
	South Canara	N.A.	N.A.	N.A.	——	——	N. A.	——	——	——
	Mandya	42	1990	45	Nil	..	..	Nil	25	Nil
Orissa . . .	Cuttack	——	——	——	——	N. A.	——	——	——	——
	Sambalpur	——	——	——	——	N. A.	——	——	——	——
Punjab . . .	Ludhiana	Nil	Nil	Nil	9482	Nil	N.A.	..	..	..
	Karnal	8	6235	159520	46765	46765	Nil	..	..	..
Rajasthan . . .	Ganganagar	——	——	——	——	N. A.	——	——	——	——
	Pali	——	——	——	——	N. A.	——	——	——	——
	Chittorgarh	——	——	——	——	N. A.	——	——	——	——
Uttar Pradesh . .	Aligarh	——	——	——	——	N. A.	——	——	——	——
	Azamgarh	1730	Nil	Nil	..	..	..	..	..	..
	Jhansi	——	——	——	——	N. A.	——	——	——	——
	Muzaffar Nagar	——	——	——	——	N. A.	——	——	——	——
West Bengal . .	Cooch Behar	3190	2000	5	..	..	..	..	..	..
Himachal Pradesh .	Sirmur	Nil	Nil	Nil	1454	N.A.	2431	..	..	..

TABLE No.1·3—*Contd.*

1	2	12	13	14	15	16	17
Mysore . .	Raichur	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	South Canara	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	Mandya	..	..	..	42	2015	45
Orissa . . .	Cuttack	N. A.					
	Sambalpur	N. A.					
Punjab . . .	Ludhiana	13497	Nil	N.A.	22979	36965	75513
	Karnal	..	..	..	49093	61590	159520
Rajasthan . .	Ganganagar	N. A.					
	Pali	N.A.	N.A.	N.A.	N.A.	22275	11930
	Chittorgarh	N.A.	N.A.	N.A.	3431	4344	6162
Uttar Pradesh . .	Aligarh	N. A.					
	Azamgarh	..	..	..	4285	1770	8940
	Jhansi	N. A.					
	Muzaffar Nagar	N.A.	N.A.	N.A.	14040	37930	40510
West Bengal . .	Cooch-Behar	..	..	..	3190	3075	5
Himachal Pradesh .	Sirmur	..	..	..	1454	N.A.	2431

TABLE No. 1·4

Outlay and expenditure on Plant Protection during 1961-62 in selected districts

Sl. No.	State	District	Outlay	Expenditure on Plant Protection					Remarks
				Pesticides	Equipments	Staff	Others	Total expenditure	
1	2	3	4	5	6	7	8	9	10
1.	Andhra Pradesh	Karimnagar	31065	27998	3050	Nil	Nil	31408	
		Chittor	41430	30099	751	10656	Nil	41506	
2.	Assam	Cachar	N.A.	14000	504	3442	16266	34212	
		Goalpara	98000	72000	Nil	8000	500	80500	
3.	Bihar	Muzaffarpur	N.A.	146183	4382	28409	500	179474	
		Shahabad	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
4.	Gujarat	Surat	15720	Nil	Nil	Nil	Nil	Nil	
		Bhavnagar	12415	Nil	5802	3525	Nil	9327	
5.	J. & K.	Srinagar	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
6.	Kerala	Trichur	205200	137296	23499	334	Nil	161129	
		Alleppey	300515	274272	9300	2176	974	286722	
7.	Madhya Pradesh	Chattarpur	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
		Balaghat	8400	Nil	400	Nil	Nil	400	
		Mandsaur	N.A.	Nil	Nil	12004	2200	14204	
		Raipur	Not fixed	N.A.	254300	Nil	Nil	254300	
8.	Madras	Thanjavur	804500	576893	34751	N.A.	N.A.	N.A.	
		South Arcot	453520	422177	14676	17681	4125	458659	
9.	Maharashtra	Kolaba	5000	2301	2301	278	2023	4602	
		Yeotmal	31608	19998	33932	8961	12960	75851*	*This includes the amount of Rs. 33932 spent on equipment as in col. 6 from out of C. D. funds.
		Bhandara	26236	8646	17590	Nil	Nil	26236	

TABLE No. 1·4—*Contd.*

1	2	3	4	5	6	7	8	9	10
10.	Mysore . .	Raichur . .	110000	10100	8089	Nil	Nil	18189	
		South Kanara .	95198	72768	82137	6469	Nil	161374	
		Mandya . .	19221	9542	14304	4944	Nil	28790	
11.	Orissa . . .	Cuttack . .	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
		Sambalpur . .	N.A.	29707	Nil	Nil	Nil	29707	
12.	Punjab . . .	Ludhiana .	N.A.	N.A.	21707	10000	100	N.A.	
		Karnal . .	8000	1852	N.A.	N.A.	2058	6566	
13.	Rajasthan . .	Ganganar . .	N.A.	40811	N.A.	15410	2945	59166	
		Pali . .	N.A.	N.A.	N.A.	4006	2236	N.A.	
		Chittoorgarh .	N.A.	Nil	Nil	4529	584	5114	
14.	Uttar Pradesh .	Aligarh . .	N.A.	21744	52862	12986	1650	89242	
		Azambgarh .	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	There was no separate Budget provision and hence data not available.
		Jhansi . .	N.A.	3528	860	12495	Nil	16883	
		Muzaffanagar .	N.A.	20000	2200	19000	4000	45200	
15.	Himachal Pradesh .	Sirmur . .	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
16.	West Bengal .	Cooch Behar .	N.A.	.A.	N.A.	N.A.	N.A.	N.A.	

TABLE No. 3·1

Percentage Distribution of Respondents by various priorities given to P. P. Measures

	Priority for P. P. and other measures	Percentage of respondents reporting in		
		Package	Non-package	All areas
	1	2	3	4
1.	Plant Protection over Improved Seeds	3·4	7·2	5·6
2.	Plant Protection over Fertilizers	3·3	8·3	6·2
3.	Same priority to Plant Protection, seeds and fertilizers	..	..	1·4
4.	Improved seed over Plant Protection	10·9	10·2	10·3
5.	Fertilizers over Plant Protection	5·9	10·3	8·4
6.	Improved seed over Fertilizers	53·8	27·4	36·9
7.	Fertilizers over improved seeds	22·7	36·6	30·5
8.	Improved seeds only	...	...	0·5
9.	Fertilizers only	..	..	0·2
	TOTAL	100·0	100·0	100·0

TABLE No. 3·2

Distribution of respondents according to their views on the responsibility for taking plant protection measures

State	Type of district	Total respondents	Block/ Govt.	Supply by Govt. & cultivators to take measures	Cultivator	Panchayat/ Gram Sabha	Others
1	2	3	4	5	6	7	8
Andhra Pradesh	P.	100	4	18	58	1	19
	N.P.	200	25	53	76	1	45
	TOTAL	300	29	71	134	2	64
Assam	P.	100	2	13	73	Nil	Nil
	N.P.	100	21	23	47	1	4
	TOTAL	200	23	36	120	1	4
Bihar	P.	100	19	11	69	1	Nil
	N.P.	100	21	Nil	78	1	Nil
	TOTAL	200	40	11	147	2	Nil
Gujarat	P.	100	18	20	58	3	Nil
	N.P.	100	Nil	95	5	Nil	Nil
	TOTAL	200	18	115	63	3	Nil
J. & K.	P.	50	28	20	Nil	Nil	2
	N. P.	N.R.					
	TOTAL	50	28	20	Nil	Nil	2

TABLE No. 3·2—*Contd.*

1	2	3	4	5	6	7	8
Kerala	P.	100	2	12	68	2	16
	N. P.	100	14	Nil	76	10	Nil
	TOTAL	200	16	12	144	12	16
Madhya Pradesh	P.	100	8	65	27	Nil	Nil
	N. P.	300	114	121	38	19	6
	TOTAL	400	122	186	65	19	6
Madras	P.	100	2	18	80	Nil	Nil
	N. P.	100	14	47	31	4	4
	TOTAL	200	16	65	111	4	4
Maharashtra	P.	100	Nil	1	98	Nil	Nil
	N. P.	200	12	77	22	31	5
	TOTAL	300	12	78	120	31	5
Mysore	P.	100	Nil	44	56	Nil	Nil
	N. P.	200	11	26	159	1	1
	TOTAL	300	11	70	215	1	1
Orissa	P.	100	7	Nil	88	Nil	1
	N. P.	100	4	13	83	Nil	Nil
	TOTAL	200	11	13	171	Nil	1
Punjab	P.	100	10	36	21	1	32
	N. P.	100	53	18	13	1	15
	TOTAL	200	63	54	34	2	47

TABLE No. 3.2—*Contd.*

1	2	3	4	5	6	7	8
Rajasthan	P.	100	16	11	62	4	5
	N. P.	200	146	10	28	11	2
	TOTAL	300	162	21	90	15	8
Uttar Pradesh	P.	100	44	3	45	Nil	7
	N. P.	300	28	125	122	17	2
	TOTAL	400	72	128	167	17	9
West Bengal	P.	100	4	14	78	2	2
	N. P.	90	9	12	64	1	Nil
	TOTAL	190	13	26	142	3	2
Himachal Pradesh	P.	N. R.					
	N. P.	100	38	20	40	Nil	Nil
	TOTAL	100	38	20	40	Nil	Nil
All States	P.	1450	164 (11·31)	286 (19·72)	881 (60·76)	14 (0·97)	84 (5·80)
	N. P.	2290	510 (22·27)	640 (27·95)	882 (38·52)	98 (4·28)	85 (3·71)
	TOTAL	3740	674 (18·02)	926 (24·76)	1763 (47·14)	112 (2·99)	169 (4·52)

The figures in brackets from Col. 4 to 10 against "All states" are percentages to Col. 3.

TABLE No. 3·3

Respondents reporting knowledgeable persons for identification of pests & diseases and prescribing measures.

	Knowledgeable persons/ Experts	Respondents reporting for								
		Identification				Prescribing measures				
		P.		N. P.		Total		P.		N. P.		Total	
	1	2		3		4		5		6		7	
1.	Village leader	33	(1·6)	29	(0·8)	62	(1·1)	33	(2·1)	60	(2·1)	93	(2·1)
2.	Panchayat President	115	(5·5)	419	(11·6)	534	(9·4)	46	(2·9)	392	(13·3)	438	(9·8)
3.	Village Lambardar	7	(0·3)	66	(1·8)	73	(1·3)	4	(0·2)	53	(1·8)	57	(1·3)
4.	Leading Cultivator	551	(26·5)	681	(18·9)	1232	(21·7)	376	(23·9)	426	(14·5)	802	(17·9)
5.	Any other	34	(1·6)	195	(5·4)	229	(4·0)	14	(0·9)	96	(3·3)	110	(2·4)
6.	Self	213	(10·2)	556	(15·4)	769	(13·5)	15	(1·0)	116	(4·0)	131	(2·9)
7.	Coop. Society	22	(1·1)	13	(0·4)	35	(0·6)	8	(0·5)	14	(0·5)	22	(0·5)
8.	V. L. W.	718	(34·5)	1121	(31·1)	1839	(32·3)	632	(40·1)	1022	(35·0)	1654	(36·8)
	A. D. O.	28	(1·3)	51	(1·4)	79	(1· 4)	40	(2·5)	92	(3·2)	132	(2·9)
	B. D. O.	17	(0·8)	76	(2·1)	93	(1·6)	30	(1·9)	86	(2·9)	116	(2·6)
	P. P. O.	7	(0·3)	22	(0·6)	29	(0·5)	11	(0·7)	28	(1·0)	39	(0·9)
	Agricultural officer	83	(4·0)	190	(5·3)	273	(4· 8)	102	(6·5)	325	(11·1)	427	(9·5)
	More than one expert	251	(12·1)	178	(4·9)	429	(7·5)	255	(16·2)	206	(7·0)	461	(10·2)
	Any other	1	(0·1)	9	(0·3)	10	(0·2)	9	(0·6)	1	(0·3)	10	(0·2)
	TOTAL	2080		3606		5686		1575		2917		4492	
	PERCENTAGES		99·9		100·0		99·9		100·0		100·0		100·0

TABLE No. 3·4

Distribution of respondents by extent of initiative or dependance for taking Plant Protection Measures

Extent of Initiative or dependance	No. Reporting P.		No. Reporting N.P.		Total	
1	2		3		4	
1. Buying both	55	(7·9)	155	(16·9)	210	(13·0)
2. Buying Equipment and waiting for material	1	(0·2)	2	(0·2)	3	(0·2)
3. Buying material and waiting for equipment	333	(47·7)	336	(36·7)	669	(41·5)
4. Waiting for both	99	(14·2)	162	(17·7)	261	(16·2)
5. Waiting for subsidised Pesticides	121	(17·3)	246	(26·9)	367	(22·7)
6. Waiting for hiring equipment	89	(12·8)	15	(1·6)	104	(6·4)
TOTAL	698		916		1614	
PERCENTAGE	100·0		100·0		100.0	

TABLE No. 3·5

Number and type of demonstrations conducted for various standing crops in the selected villages during 1961-62 *and* 1962-63.

Name of crops	No. of villages			1961-62									Total No. of demonstrations
				Type and number of Demonstration									
				Method			Result			Composites			
	Package	Non-package	Total	Package	Non-package	Total	Package	Non-package	Total	Package	Non-package	Total	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Paddy . . .	120	190	310	30	26	56	5	4	9	12	..	12	77
Wheat	50	80	130	2	..	2	..	..	..	2	..	2	4
Jowar	20	40	60	1	1	2	..	..	..	..	..	..	2
S. Cane	80	150	230	11	2	13	1	1	2	..	..	..	15
Gr. Nut . . .	60	100	160	3	4	7	1	..	1	..	..	..	8
Cotton . . .	50	110	160	..	2	2	..	..	..	..	..	..	2
TOTAL . . .	380	670	1050	47	35	82	7	5	12	14	..	14	108

TABLE No. 3·5—*Contd.*

Name of crops	1962-63									Total No. of demonstrations
	Type and number of Demonstration									
	Method			Result			Composites			
	Package	Non-package	Total	Package	Non-package	Total	Package	Non-package	Total	
1		16	17	18	19	20	21	22	23	24
Paddy	27	17	44	5	..	5	16	..	16	65
Wheat . . .	..	2	2	..	2	2	2	..	2	6
Jowar . .	1	1	2	..	..	..	..	..	..	2
S. Cane . .	8	2	10	..	..	..	3	..	3	13
Gr. Nut . . .	5	7	12	1	1	2	..	..	..	14
Cotton . .	..	3	3	..	2	2	..	..	..	5
TOTAL . . .	41	32	73	6	5	11	21	..	21	105

TABLE No. 4-1

Distribution of selected villages according to sources of supply of P. P. Material and their effectiveness.

State	No. of villages reporting supply of pesticides by						No. of villages reporting supply of equipment by					
	Government		Village Institutions		Private		Government		Village Institutions		Private	
	Package	Non-package	Package	Non-package	Package	Non-package	Package	Non-package	Package	Non-package	Package	Non-package
1	2	3	4	5	6	7	8	9	10	11	12	13
1. Andhra Pradesh	10	16	7	2	9	5	10	14	7	4	..	..
2. Assam	3	9	..	..	..	..	..	8	..	..	..	..
3. Bihar	7	10	5	..	..	..	1	10	..	..	..	..
4. Gujarat	2	1	5	4	4	1	2	2	5	2	4	3
5. J. & K.	1	..	..	..	..	..	3	..	..	..	..	..
6. Kerala	9	10	5	5	10	3	10	10	5	2	10	..
7. Madhya Pradesh	..	23	10	3	..	1	..	17	..	1	..	..
8. Madras	10	10	1	..	..	5	10	10	..	2	..	..
9. Maharashtra	3	5	..	1	..	2	3	10	..	7	..	1
10. Mysore	2	2	8	9	6	11	7	11	7	..	4	11
11. Orissa	8	5	3	2	..	..	5	..	..	..	..	..
12. Punjab	10	4	9	..	7	6	10	7	..	12	..	1
13. Rajasthan	3	18	9	1		5	3	12	3	..	..	1
14. Uttar Pradesh	6	14	..	12	1	14	4	11	..	5	..	..
15. West Bengal	9	9	2	..	1	..	3	8	3	2	..	..
16. Himachal Pradesh	..	9	..	..	..	..	..	2	..	..	..	..
TOTAL	83	145	64	39	38	53	71	132	30	37	18	17

TABLE NO. 4·1—*Contd.*

State	No. of villages reporting Agencies demonstrating Pesticides						No. of villages reporting the matrial Supply			
	Government		Village Institutions		Private		Effective		Non-effective	
	Package	Non-package	Package	Non-package	Package	Non-package	Package	Non-package	Package	Non-package
1	14	15	16	17	18	19	20	21	22	23
Andhra Pradesh	9	8	3	..	..	..	10	15	..	2
Assam	..	..	..	..	..	..	3	6	..	3
Bihar	5	10	3	..	..	..	6	4	..	..
Gujarat	1	2	..	..	..	..	4	5	..	..
J. & K.	..	..	..	..	..	..	4	..	..	..
Kerala	..	7	..	..	..	..	10	10	..	..
Madhya Pradesh	7	8	..	..	..	..	10	23	..	..
Madras	..	10	..	..	..	..	10	10	..	..
Maharashtra	..	1	..	..	..	..	4	6	..	1
Myore	10	5	..	..	..	..	9	10	..	..
Orissa	1	..	..	..	..	..	7	5	..	1
Punjab	..	11	..	1	..	..	10	8	..	..
Rajasthan	..	11	..	1	..	..	10	8	..	..
Uttar Pradesh	3	1	..	..	..	..	5	20	..	1
West Bengal	..	1	..	..	..	..	9	8	..	..
Himachal Pradesh	..	..	..	..	..	..	..	9	..	..
TOTAL	36	75	6	2	..	..	111	147	..	8

TABLE NO. 4·2

Location and distribution of supply depots of various agencies for the selected Villages—(i) Package and non-package

State	No. of villages reporting location of depot.					
	Government		Village Institution		Private	
	Inside Village	Outside Village	Inside Village	Outside Village	Inside Village	Outside Village
1	2	3	4	5	6	7
Andhra Pradesh	3	27	10	7	..	14
Assam	1	11	..	..	..	..
Bihar	1	16	..	5	..	..
Gujarat	..	4	6	6	2	6
J. & K.	..	4	..	..	..	..
Kerala	12	8	3	4	10	11
Madhya Pradesh	8	15	3	11	..	3
Madras	1	19	2	1	..	5
Maharashtra	4	11	7	4	..	4
Mysore	6	12	6	11	7	21
Orissa	6	17	1	4	..	..
Punjab	8	11	9	9	1	12
Rajasthan	4	19	4	5	..	5
Uttar Pradesh	6	17	6	14	1	12
West Bengal	4	15	1	4	..	2
Himachal Pradesh	2	7	..	..	..	..
TOTAL	66	213	58	85	21	95

TABLE NO. 4·2—*Package and non-package—Contd.*

State	Number of villages (not having the depot in the village) according to distance of the depot (in Km.) from the Village											
	Government				Village Institution				Private			
	1—3	3—5	5—10	10 & above	1—3	3—5	5—10	10 & above	1—3	3—5	5—10	10 & above
1	8	9	10	11	12	13	14	15	16	17	18	19
Andhra Pradesh	12	7	8	...	4	...	3	..	2	3	7	2
Assam	6	5	...	...	...	...	...	..	...	..	..	...
Bihar	2	5	3	6	...	...	1	4	..	..	...	...
Gujarat	...	...	...	4	...	2	4	..	2	..	4	...
J. & K.	3	...	...	1	...	...	...	...	...	...	...	...
Kerala	1	2	5	...	1	2	1	...	...	1	4	6
Madhya Pradesh	5	5	3	2	6	2	...	3	...	...	1	2
Madras	5	2	7	5	1	...	...	...	...	1	1	3
Maharashtra	5	3	3	...	...	2	...	2	1	2	1	...
Mysore	3	5	4	...	5	3	3	...	2	7	5	7
Orissa	16	1	...	...	2	1	1	...	...	...	...	...
Punjab	4	3	4	...	1	3	4	1	6	...	6	...
Rajasthan	7	7	5	...	5	...	...	...	...	2	2	1
Uttar Pradesh	16	1	...	...	7	3	3	1	7	2	3	...
West Bengal	7	3	2	3	2	1	1	...	...	...	...	...
Himachal Pradesh	4	...	2	1	...	...	...	...	...	...	...	...
TOTAL	96	49	46	22	34	19	21	11	20	18	34	23

TABLE NO. 4·2—(il) *Package only—Contd.*

1	2	3	4	5	6	7
Andhra Pradesh	2	10	8	4	..	9
Assam	...	3	...	..	...	...
Bihar	..	7	..	5	..	..
Gujarat	...	2	6	2	1	4
J. & K.	..	4	..	..	..	...
Kerala	3	7	1	4	9	9
Madhya Pradesh	..	..	2	8	..	...
Madras	1	9	..	..	..	—
Maharashtra	2	1	..	..	..	—
Mysore	4	3	4	4	..	7
Orissa	..	8	1	2	..	..
Punjab	5	5	8	5	1	9
Rajasthan	—	3	4	4	..	..
Uttar Pradesh	3	3	..	4	..	..
West Bengal	2	8	1	4	..	2
TOTAL	22	73	35	46	11	40

TABLE NO. 4·2—(ii) *Package only—Contd.*

1	8	9	10	11	12	13	14	15	16	17	18	19
Andhra Pradesh . . .	4	5	1	—	4	...	...	—	1	2	6	—
Assam	—	3	—	—	—	—	—	—	—	—	—	—
Bihar	—	—	1	6	...	...	1	4	...	—	—	—
Gujarat	—	—	—	2	—	2	...	—	1	—	3	—
J. & K.	3	...	—	1	...	...	...	...	—	—	—	—
Kerala	1	1	5	..	1	2	1	—	..	—	3	6
Madhya Pradesh . . .	—	...	—	...	5	...	...	3	—	—	—	—
Madras	5	2	2	...	—	...	—	—	—	—	—	—
Maharashtra	—	—	1	...	—	...	—	—	—	—	—	—
Mysore	2	1	...	...	4	...	—	—	1	2	2	2
Orissa	8	..	—	...	2	...	..	...	..	..	..	—
Punjab	3	2	—	—	1	2	2	...	3	..	6	—
Rajasthan	1	1	1	..	4	...	..	...	...	—	..	—
Uttar Pradesh	3	...	..	...	2	1	1	..	...	...	..	—
West Bengal	3	..	2	3	2	1	1	...	..	...	..	2
TOTAL . . .	33	15	13	12	25	8	6	7	6	4	20	10

TABLE NO. 4·2—(iii) *Non-package only—Contd.*

1	2	3	4	5	6	7
Andhra Pradesh	1	17	2	3	..	5
Assam	1	8	..	..	..	..
Bihar	1	9	..	..	...	..
Gujarat	—	2	...	4	1	2
Kerala	9	1	2	—	1	2
Madhya Pradesh	8	15	1	3	...	3
Madras	...	10	2	1	...	5
Maharashtra	2	10	7	4	—	4
Mysore	2	9	2	7	7	14
Orissa	6	9	...	2	...	..
Punjab	3	6	1	4	..	3
Rajasthan	4	16	..	1	..	5
Uttar Pradesh	3	14	6	10	1	12
West Bengal	2	7	...	..	..	..
Himachal Pradesh	2	7	..	..	..	—
TOTAL	44	140	23	39	10	55

TABLE NO. 4·2—(iii) *Non-package only—Contd.*

1	8	9	10	11	12	13	14	15	16	17	18	19
Andhra Pradesh . . .	8	2	7	..	..	..	3	...	1	1	1	2
Assam	6	2	...	...	...	...	...	...	...	...	...	...
Bihar	2	5	2	...	...	...	...	...	...	..	..	..
Gujarat	...	...	..	2	...	...	4	...	1	...	1	..
Kerala	..	1	..	..	...	..	...	...	..	1	1	..
Madhya Pradesh . . .	5	5	3	2	1	2	...	..	...	..	1	2
Madras	..	..	5	5	1	...	...	...	..	1	1	3
Maharashtra	5	3	2	...	..	2	..	2	1	2	1	...
Mysore	1	4	4	...	1	3	3	...	1	5	3	5
Orissa	8	1	...	...	...	1	1	...	...	...	..	..
Punjab	1	1	4	...	...	1	2	1	3	..	..	...
Rajasthan	6	6	4	...	1	...	...	...	..	2	2	1
Uttar Pradesh	13	1	...	...	5	2	2	1	7	2	3	..
West Bengal	4	3	..	..	...	..	...	..	..	..	..	..
Himachal Pradesh . . .	4	..	2	1	...	..	..	..	..	..	..	..
TOTAL	63	34	33	10	9	11	15	4	14	14	14	13

TABLE NO. 4·3

Particulars of P. P. equipment and repair arrangement

(a) *Seed drum*

State	Total No. of villages		No. of villages reporting Agencies having equipment					
			Government		Village institution		Private	
	Package	Non-package	Package	Non-package	Package	Non-package	Package	Non-package
1	2	3	4	5	6	7	8	9
Bihar	10	10	5	7	..	..	..	..
Kerala	10	..	9	...	...	..	..	...
Madras	10	...	4	...	...	...	...	...
Orissa	10	...	5	...	...	...	...	...
Rajasthan	10	20	1	2	1	...	...	...
Uttar Pradesh	10	...	5	...	...	...	...	...
Madhya Pradesh . . .	...	30	...	5	...	1	...	...
Maharashtra	...	20	..	13	..	...	...	...
Himachal Pradesh . . .	...	10	..	6	...	..	..	...
TOTAL . . .	60	90	29	33	1	1	...	...

TABLE NO. 4·3 (a)—*Contd.*

State	No. of equipment in the village		No. of villages reporting equipment supply free		No. of equipment owned by cultivators in the Village			
					1961-62		1962-63	
	Package	Non-package	Package	Non-package	Package	Non-package	Package	Non-package
1	10	11	12	13	14	15	16	17
Bihar	5	7	5	7	...	..	..	...
Kerala	16	...	8	...	...	...	...	...
Madras	4	..	4	..	...	...	..	...
Orissa	5	..	5	..	..	..	...	...
Rajasthan	2	2	2	2	..	..	...	..
Uttar Pradesh	9	..	3	..	...	..	..	..
Madhya Pradesh . . .	...	6	..	5	..	..	..	..
Maharashtra	...	13	..	8	..	...	..	..
Himachal Pradesh . . .	..	6	..	6	..	..	..	..
TOTAL	41	34	27	28	..	..	..	..

TABLE NO. 4·3—*Contd.*

(b) *Sprayers*

State	Total No. of villages		No. of villages reporting Agencies having equipment					
			Government		Village institutions		Private	
	Package	Non-package	Package	Non-package	Package	Non-package	Package	Non-package
1	2	3	4	5	6	7	8	9
Andhra Pradesh . . .	10	20	10	15	8	4	1	3
Assam	10	10	9	9	..	1	1	..
Bihar	10	10	10	10	..	..	..	..
Gujarat	10	10	6	5	5	8	2	3
Kerala	10	10	8	9	6	4	5	..
Madras	10	10	10	9	10	9	..	9
Maharashtra	10	20	10	15	..	7	..	3
Mysore	10	20	10	12	7	2	3	9
Madhya Pradesh . . .	10	30	10	18	...	2	...	...
Orissa	10	10	10	10	5	5	...	..
Punjab	10	10	10	6	9	..	..	5
Rajasthan	10	20	5	17	3	...	..	..
Uttar Pradesh	10	30	7	11	..	1	...	2
West Bengal	10	10	10	9	..	...	...	..
Himachal Pradesh . . .	..	10	..	7	..	...	..	..
TOTAL . . .	140	230	125	162	53	43	12	34

TABLE NO. 4·3 (b)—*Contd.*

State	No. of equipment reported in the village		No. of villages reporting equipment supply free		No. of equipment owned by cultivators in the village			
					1961-62		1962-63	
	Package	Non-package	Package	Non-package	Package	Non-package	Package	Non-package
1	10	11	12	13	14	15	16	17
Andhra Pradesh . . .	39	25	6	15	3	4	3	4
Assam	12	11	4	8	..	..	..	1
Bihar	10	11	10	10	..	2	..	2
Gujarat	24	20	2	7	3	2	2	2
Kerala	...	49	61	4	8	37	4	46
Madras	61	6	3	33	8	2	4	7
Maharashtra	10	37	5	8	..	1	...	1
Mysore	51	89	10	19	1	56	3	68
Madhya Pradesh . . .	18	25	10	21	..	3	..	3
Orissa	25	16	10	10	4	..	4	..
Punjab	27	29	10	5	...	19	...	19
Rajasthan	8	19	5	11	1	..	1	..
Uttar Pradesh	18	17	7	4	..	..	...	..
West Bengal	13	12	9	9	..	..	...	..
Himachal Pradesh . . .	..	14	..	..	..	..	..	..
TOTAL	316	380	152	164	28	126	21	153

TABLE NO. 4·3—*Contd.*

(c) *Dusters*

State	Total No. of villages		No. of villages reporting Agencies having equipment					
			Government		Village institutions		Private	
	Package	Non-package	Package	Non-package	Package	Non-package	Package	Non-package
1	2	3	4	5	6	7	8	9
Andhra Pradesh . . .	10	20	1	8	1	..	..	...
Assam	10	10	9	8	..	..	..	...
Bihar	10	10	9	10	..	1	...	...
Gujarat	10	10	..	2	..	6	...	1
Kerala	10	10	5	9	..	2	..	...
Maharashtra	10	20	10	17	..	3	...	...
Madras	10	10	5	2	..	1	...	1
Mysore	10	20	9	4	2	..	2	...
Madhya Pradesh . . .	10	30	10	28	..	5	..	2
Orissa	10	10	8	10	..	5	...	...
Punjab	10	10	6	8	2	1	..	5
Rajasthan	10	20	2	14	3	..	..	..
Uttar Pradesh	10	30	9	24	..	7	1	2
West Bengal . . .	10	10	10	10	..	..	..	
TOTAL . . .	140	220	93	154	8	31	3	11

TABLE NO. 4·3 (c)—*Contd.*

State	No. of equipment reported in the village		No. of villages reporting		No. of equipment owned by cultivators in the village			
					1961-62		1962-63	
	Package	Non-package	Package	Non-package	Package	Non-package	Package	Non-package
1	10	11	12	13	14	15	16	17
Andhra Pradesh	2	8	..	5	...	..	...	..
Assam	12	9	4	7	...	...	...	..
Bihar	9	10	9	10	...	3	...	3
Gujarat	..	9	...	4	...	1	...	1
Kerala	13	26	5	4	...	1	...	1
Maharashtra	10	33	...	9	...	..	...	..
Madras	5	9	5	7	...	1	...	1
Mysore	27	4	8	4	..	...	..	..
Madhya Pradesh . . .	65	55	10	27	...	..	..	..
Orissa	8	15	3	10	...	...	...	..
Punjab	8	19	6	7	...	..	..	..
Rajasthan	5	20	3	10	..	..	..	..
Uttar Pradesh	15	37	9	20	..	..	..	..
West Bengal	15	32	5	10	..	..	..	..
TOTAL . . .	194	286	67	134		6	..	6

TABLE NO. 5·1

Distribution of respondents reporting knowledge of Preventive Plant Protection measures by type of measures

State	Total No. of respondents			No. of respondents having knowledge of								
				Chemical Measures			Cultural Measures			Mechanical Measures		
	Package	Non-package	All areas	Package	Non-package	All areas	Package	Non-package	All areas	Package	Non-package	All areas
1	2	3	4	5	6	7	8	9	10	11	12	13
Andhra Pradesh	100	200	300	83	63	146	..	77	77	5	75	80
Bihar	100	100	200	69	40	109	14	..	14	10	..	10
Gujarat	100	100	200	13	46	59	2	..	2	9	..	9
J. & K.	50	..	50	21	..	21	..	..	..	50	..	50
Kerala	100	100	200	73	7	80	..	..	..	13	..	13
Madhya Pradesh	100	300	400	55	30	85	..	9	9	..	101	101
Madras	100	100	200	18	7	25	..	1	1	99	100	199
Maharashtra	100	200	300	..	40	40	..	..	..	..	..	..
Mysore	100	200	300	47	86	133	39	..	39	3	..	3
Orissa	100	100	200	1	4	5	..	2	2	..	27	27
Punjab	100	100	200	87	79	166	65	2	67	53	8	61
Rajasthan	100	200	300	10	32	42	..	..	..	3	..	3
Uttar Pradesh	100	300	400	17	80	97	4	97	101	..	1	1
West Bengal	100	90	190	8	8	16	..	..	..	..	..	..
Himachal Pradesh	..	100	100	..	76	76	..	76	76	..	12	12
All States	1450*	2290*	3740*	502 (34·62)	598 (26·27)	1100 (29·41)	124 (8·55)	264 (11·53)	388 (10·37)	245 (16·90)	324 (14·28)	569 (15·29)

*100 respondents in each package (Col. 2) and non-package (Col. 3) in respect of Assam are included here. There were no cases of awareness.

TABLE NO. 5·1 (A)

Distribution of respondents reporting knowledge of preventive Plant Protection Measures for different stages of crop. Crop group-wise (Preventive) and by type of treatment

Crop-wise

Crop	Type of treatment	Type of district	Total No. of respondents	No. with knowledge of P.P. measures	Storage stage		Sowing stage		Standing crop stage		Storing & sowing stage	Sowing & standing crop stage	Storing & standing crop stage
					Before '56	After '56	Before '56	After '56	Before '56	After '56			
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Paddy . .	Chemical .	P . .	1450	332 (22·90)	2 (0·14)	13 (0·90)	3 (0·21)	226 (15·59)	7 (0·48)	188 (12·97)	2 (0·14)	94 (6·48)	1 (0·07)
		N. P. .	2290	224 (9·78)	79 (3·45)	46 (2·01)	7 (0·31)	50 (2·18)	6 (0·26)	35 (1·53)	3 (0·13)	20 (0·87)	7 (0·31)
		TOTAL :	3740	556 (14·87)	81 (2·17)	59 (1·58)	10 (0·27)	276 (7·38)	13 (0·35)	223 (5·96)	5 (0·13)	114 (3·05)	8 (0·21)
	Cultural	P. . .	1450	15 (1·03)	1 (0·07)	Nil	Nil	Nil	1 (0·07)	5 (0·34)	Nil	Nil	1
		N. P. .	2290	75 (3·28)	Nil	Nil	65 (2·84)	4 (0·17)	70 (3·06)	5 (0·22)	Nil	69 (3·01)	Nil
		TOTAL .	3740	90 (2·41)	1 (0·03)	Nil Nil	65 (1·74)	4 (0·11)	71 (1·90)	10 (0·27)	Nil Nil	69 (1·84)	1 (0·03)
	Mechanical	P. . .	1450	111 (7·66)	107 (7·38)	Nil	97 (6·69)	1 (0·07)	1 (0·07)	2 (0·14)	96 (6·62)	1 (0·07)	Nil
		N. P. .	2290	276 (12·05)	269 (11·75)	7 (0·31)	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		TOTAL .	3740	387 (10·35)	376 (10·05)	7 (0·19)	97 (2·59)	1 (0·03)	1 (0·03)	2 (0·05)	96 (2·57)	1 (0·03)	Nil

TABLE NO. 5·1(A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Jowar . .	Chemical .	P. . .	1450	22 (1·52)	11 (0·76)	Nil	Nil	Nil	3 (0·21)	8 (0·55)	Nil	Nil	Nil
		N. P. .	2290	147 (6·42)	Nil	16 (0·70)	36 (1·57)	88 (3·84)	1 (0·04)	20 (0·87)	3 (0·12)	21 (0·92)	Nil
		TOTAL .	3740	169 (4·52)	11 (0·29)	16 (0·43)	36 (0·96)	88 (2·35)	4 (0·11)	28 (0·75)	3 (0·08)	21 (0·56)	Nil
	Cultural .	P. . .	1450	2 (1·38)	1 (0·07)	Nil	Nil	Nil	1 (0·07)	1 (0·07)	Nil	Nil	1 (0·07)
		N. P. .	2290	18 (0·79)	18 (0·79)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		TOTAL .	3740	20 (0·53)	19 (0·51)	Nil Nil	Nil Nil	Nil Nil	1 (0·07)	3 (0·21)	Nil	Nil	Nil
	Mechanical .	P. . .	1450	5 (0·34)	1 (0·07)	Nil	Nil	1 (0·07)	3 (0·21)	Nil	Nil	Nil	Nil
		N. P. .	2290	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		TOTAL .	3740	5 (0·13)	1 (0·03)	Nil	Nil	1 (0·03)	3 (0·08)	Nil	Nil	Nil	Nil

TABLE No. 5·1 (A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Wheat . .	Chemical .	P . .	1450	155	10	92	2	34	Nil	10	12	2	Nil
				(10·69)	(0·69)	(6·34)	(0·14)	(2·34)		(0·69)	(0·83)	(0·14)	
		N. P. .	2290	270	58	94	11	115	1	10	6	3	1
				(11·79)	(2·53)	(4·10)	(0·48)	(5·02)	(0·04)	(0·44)	(0·26)	(0·13)	(0·04)
		TOTAL .	3740	425	68	186	13	149	1	20	18	5	1
				(11·36)	(1·82)	(4·97)	(0·35)	(3·98)	(0·03)	(0·53)	(0·48)	(0·13)	(0·03)
	Cultural .	P . .	1450	14	Nil	Nil	1	Nil	1	3	Nil	Nil	Nil
				(0·97)			(0·07)		(0·07)	(0·21)			
		N. P .	2290	177	87	2	86	1	Nil	9	8	Nil	Nil
				(7·73)	(3·80)	(0·09)	(3·76)	(0·04)		(0·39)	(0·35)	Nil	Nil
		TOTAL .	3740	191	87	2	87	1	1	12	8	Nil	Nil
				(5·11)	(2·33)	(0·05)	(2·33)	(0·03)	(0·03)	(0·32)	(0·21)		
	Mechanical .	P . .	1450	65	Nil	4	6	46	3	9	3	Nil	Nil
				(4·48)		(0·38)	(0·41)	(3·17)	(0·21)	(0·62)	(0·21)	Nil	
		N. P. .	2290	106	84	1	15	6	Nil	Nil	Nil	Nil	Nil
				(4·63)	(3·67)	(0·04)	(0·66)	(0·26)					
		TOTAL .	3740	171	84	5	21	52	3	9	3	Nil	Nil
				(4·57)	(2·25)	(0·13)	(0·56)	(1·39)	(0·08)	(0·24)	(0·08)		

TABLE No. 5·1 (A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Groundnut	Chemical	P	1450	20 (1·38)	Nil	Nil	Nil	20 (1·38)	Nil	Nil	Nil	Nil	Nil
		N.P.	2290	43 (1·88)	Nil	4 (0·17)	1 (0·04)	6 (2·62)	1 (0·04)	2 (0·09)	Nil	6 (0·26)	18 (0·79)
		TOTAL	3740	63 (1·68)	Nil	4 (0·11)	1 (0·03)	26 (0·70)	1 (0·03)	2 (0·05)	Nil	6 (0·16)	18 (0·48)
	Cultural	P	1450	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		N.P.	2290	37 (1·62)	Nil	Nil	Nil	Nil	35 (1·62)	2 (0·09)	Nil	Nil	Nil
		TOTAL	3740	37 (0·99)	Nil	Nil	Nil	Nil	35 (9·36)	2 (0·05)	Nil	Nil	Nil
	Mechanical	P	1450	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		N. P.	2290	21 (0·92)	21 (0·92)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		TOTAL	3740	21 (0·56)	21 (0·56)	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

TABLE No. 5·1 (A) —*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
All Crops	Chemical	P	1450	502 (34·67)	18 (1·24)	105 (7·24)	32 (2·21)	261 (18·00)	30 (2·67)	222 (15·31)	26 (1·79)	128 (8·83)	2 (0·14)
		N.P.	2290	598 (26·17)	91 (3·97)	119 (5·20)	59 (2·58)	285 (12·45)	23 (1·00)	89 (3·89)	17 (0·74)	45 (1·97)	19 (0·83)
		TOTAL	3740	1100 (29·41)	109 (2·91)	224 (5·99)	91 (2·43)	546 (14·60)	53 (1·42)	311 (8·32)	43 (1·15)	173 (4·63)	21 (0·51)
	Cultural	P	1450	124 (8·55)	3 (0·21)	—	42 (2·90)	50 (3·45)	37 (2·55)	9 (0·62)	1 (0·07)	24 (1·66)	1 (0·07)
		N. P.	2290	264 (11·53)	95 (4·15)	2 (0·09)	150 (6·55)	10 (0·44)	69 (3·01)	18 (0·79)	8 (0·35)	72 (3·14)	—
		TOTAL	3740	388 (10·37)	98 (2·62)	2 (0·05)	192 (5·13)	60 (1·60)	106 (2·83)	27 (0·72)	9 (0·24)	96 (2·57)	1 (0·03)
	Mechanical	P	1450	245 (16·90)	108 (7·45)	4 (0·28)	152 (10·48)	48 (3·31)	70 (4·83)	12 (0·83)	99 (6·83)	50 (3·45)	—
		N. P.	2290	327 (14·28)	293 (12·79)	11 (0·48)	15 (0·66)	7 (0·31)	—	—	—	—	—
		TOTAL	3740	572 (15·29)	401 (10·72)	15 (0·40)	167 (4·47)	55 (1·17)	70 (1·87)	12 (0·32)	99 (2·64)	50 (1·34)	—

TABLE No. 5·2

Distribution of Respondents Reporting knowledge of Preventive—Plant Protection Measures from different agencies at different stages, crop-wise

Crop	Package & Non-package	Total No. of respondents	No. having knowledge of the measures	No. reporting agency for aqcuiring knowledge	Storage Stage			Sowing Stage			Standing crop stage		
					Government	Private Institution	Others	Government	Private Institution	Others	Government	Private Institution	Others
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Chemical Measures													
Paddy	Package	1450	332	323	11	—	4	180	3	46	124	1	77
	Non-package	2290	224	196	87	—	38	45	—	12	27	—	15
	TOTAL	3740	556	519	98	—	42	225	3	58	151	1	92
Jowar	Package	1450	22	22	—	—	11	—	—	—	2	—	9
	Non-Package	2290	147	134	13	—	3	50	—	74	19	—	2
	TOTAL	3740	169	156	13	—	14	50	—	74	21	—	11
Wheat	Package	1450	155	146	43	—	57	35	—	1	10	—	—
	Non-Package	2290	270	269	113	3	36	80	2	44	10	—	1
	TOTAL	3740	425	415	158	3	93	115	2	45	20	—	1
All crops	Package	1450	502	493	56	—	68	207	3	92	149	1	119
	Non-Package	2290	598	570	140	3	68	197	9	149	78	1	37
	TOTAL	3740	1100	1063	196	3	136	404	12	241	227	2	156

TABLE No.5·2—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Cultural Measures													
Paddy . .	Package .	1450	15	6	..	..	1	..	..	..	5	..	1
	Non-Package .	2290	75	75	..	..	..	..	..	69	..	..	75
	TOTAL . .	3740	90	81	..	..	1	..	..	69	5	..	76
Jowar . .	Package .	1450	2	2	..	..	1	..	..	..	1	..	2
	Non-Package .	2290	18	18	..	..	18	..	..	..	..	..	..
	TOTAL . .	3740	20	20	..	..	19	..	..	..	1	..	2
Wheat . .	Package .	1450	14	5	..	..	..	..	..	1	3	..	1
	Non-package .	2290	177	177	1	..	89	18	..	69	9	..	
	TOTAL . .	3740	191	182	1	..	89	18	..	70	12	..	1
All crops . .	Package .	1450	124	115	..	..	3	23	..	70	8	..	39
	Non-package .	2290	264	264	1	..	97	19	..	141	9	..	78
	TOTAL . .	3740	388	379	1	..	100	42	..	211	17	..	117

TABLE No. 5·2—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mechanical Measures													
Paddy . .	Package .	1450	111	111	..	..	107	..	1	96	2	..	1
	Non-package .	2290	276	276	..	..	276	..	..	..	..	..	..
	TOTAL . .	3740	387	387	..	..	383	..	1	96	2	..	1
Jowar . .	Package .	1450	5	5	..	..	1	..	..	..	1	..	3
	Non-package .	2290	..	..	..	..	..	..	..	..	..	..	..
	TOTAL . .	3740	5	5	..	..	1	..	..	..	1	..	3
Wheat . .	Package .	1450	65	65	2	..	2	24	..	28	9	..	3
	Non-package .	2290	106	106	..	..	85	8	..	13	..	..	..
	TOTAL . .	3740	171	171	2	..	87	32	..	41	9	..	3
All crops . .	Package .	1450	245	245	2	..	110	26	1	173	12	..	70
	Non-package .	2290	327	327	1	..	304	9	..	13	..	..	..
	TOTAL . .	3740	572	572	3	..	414	35	1	186	12	..	70

TABLE No. 5·3

Distribution of respondents reporting knowledge of Curative plant protection measures by type of measures

State	Total No. of respondents			Chemical Measures			Cultural Measures			Mechanical Measures			Biological Measures		
	Package	Non-package	Total	Package	Non-package	Total	Package	Non-package	Total	Package	Non-package	Total	Package	Non-package	Total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
A. Pradesh	100	200	300	85	114	199	1	72	73	4	75	79	..	..	..
Assam	100	100	200	48	34	82	..	..	..	..	1	1	..	..	..
Bihar	100	100	200	69	46	115	14	..	14	9	..	9	..	..	..
Gujarat	100	100	200	34	23	57	..	..	..	41	..	41	..	..	..
J. & K.	50	..	50	21	..	21	45	..	45	7	..	7	..	..	..
Kerala	100	100	200	96	92	188	1	1	2	65	88	153	1	..	1
M. Pradesh	100	300	400	19	82	101	..	13	13	..	127	127	..	1	1
Madras	100	100	200	35	52	87	..	15	15	50	9	59	..	..	..
Maharashtra	100	200	300	8	22	30	..	..	..	..	..	..	..	..	..
Mysore	100	200	300	49	106	155	23	..	23	20	..	20	10	..	10
Orissa	100	100	200	8	45	53	..	2	2	..	22	22	..	..	..
Punjab	100	100	200	62	30	92	..	8	8	37	3	40	..	..	..
Rajasthan	100	200	300	65	53	118	..	..	..	1	..	1	..	..	..
U. Pradesh	100	300	400	2	73	75	2	117	119	..	15	15	1	..	1
W. Bengal	100	90	190	40	68	108	..	..	..	..	..	..	..	..	..
H. Pradesh	..	100	100	..	47	47	..	..	..	..	39	39	..	..	..
All States	1450	2290	3740	641	887	1528	86	228	314	234	379	613	12	1	13
				(44·21)	(38·73)	(40·86)	(5·93)	(9·96)	(8·40)	(16·16)	(16·55)	(16·39)	(0·8)	(0·05)	(0·3)

TABLE No. 5·3(A)

Distribution of respondents reporting knowledge about curative Plant Protection measures according to different Stages of crop and by types of treatment

Crop-wise.

Crop	Type of treatment	Type of District	Total No. of respondents	No. with knowledge of P.P.M. % to Col. 4	Storage stage		Sowing stage		Standing Crop Stage		Storing and sowing stage	Sowing & standing crop stage	Storing & Standing crop stage
					Before '56	After '56	Before '56	After '56	Before '56	After '56			
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Paddy	Chemical	P	1450	463 (31·93)	Nil	9 (0·62)	4 (0·28)	80 (5·52)	14 (0·97)	436 (30·07)	Nil Nil	79 (5·45)	14 (0·97)
		N.P.	2290	619 (27·03)	50 (2·18)	26 (1·14)	6 (0·26)	9 (0·39)	54 (2·36)	512 (22·38)	Nil Nil	5 (0·22)	31 (1·35)
		TOTAL	3740	1082 (28·09)	50 (1·34)	35 (0·94)	10 (0·27)	89 (2·38)	68 (1·82)	948 (25·35)	Nil Nil	84 (2·25)	45 (1·20)
	Cultural	P.	1450	60 (4·14)	Nil Nil	Nil Nil	45 (3·10)	1 (0·07)	Nil Nil	5 (0·34)	Nil Nil	Nil Nil	Nil Nil
		N.P..	2290	95 (4·15)	Nil Nil	Nil Nil	67 (2·92)	4 (0·17)	15 (0·66)	8 (0·35)	Nil Nil	Nil Nil	Nil Nil
		TOTAL	3740	155 (4·14)	Nil Nil	Nil Nil	112 (2·99)	5 (0·13)	15 (0·40)	13 (0·35)	Nil Nil	Nil Nil	Nil Nil
	Mechanical	P	1450	98 (6·76)	79 (5·45)	1 (0·07)	55 (3·79)	2 (0·14)	21 (1·45)	7 (0·48)	50 (3·45)	1 (0·07)	16 (0·43)
		N.P.	2290	213 (9·30)	103 (4·50)	6 (0·26)	1 (0·04)	Nil Nil	94 (4·10)	10 (0·44)	1 (0·04)	Nil Nil	Nil Nil
		TOTAL	3740	311 (8·32)	182 (4·86)	7 (0·19)	56 (1·50)	2 (0·05)	115 (3·07)	17 (0·45)	51 (1·36)	1 (0·03)	16 (0·43)

TABLE No. 5·3(A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Biological	P	1450	2 (0·14)	Nil Nil	Nil Nil	Nil Nil	2 (0·14)	Nil Nil	Nil Nil	Nil Nil	Nil Nil	Nil Nil
		N.P.	2290	1 (0·04)	Nil Nil	Nil Nil	Nil Nil	Nil Nil	Nil Nil	1 (0·04)	Nil Nil	Nil Nil	Nil Nil
		TOTAL	3740	3 (0.09)	Nil Nil	Nil Nil	Nil Nil	2 (0.05)	Nil Nil	1 (0.03)	Nil Nil	Nil Nil	Nil Nil
Jowar	Chemical	P	1450	4 0·28)	Nil	Nil	Nil	Nil	Nil	4 (0·28)	Nil	Nil	Nil
		N.P.	2290	37 (1·62)	Nil	13 (0·57)	Nil	1 (0·04)	1 (0·04)	16 (0·70)	1 (0·04)	Nil	Nil
		TOTAL	3740	41 (1·10)	Nil	13 (0·35)	Nil	1 (0·03)	1 (0·03)	20 (0·53)	1 (0·03)	Nil	Nil
	Cultural	P	1450	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		N.P.	2290	4 (0·17)	Nil	Nil	Nil	Nil	Nil	4 (0·11)	Nil	Nil	Nil
		TOTAL	3740	4 (0·11)	Nil	Nil	Nil	Nil	Nil	4 (0·17)	Nil	Nil	Nil
	Mechanical	P	1450	30 (2·07)	20 (1·38)	1 (0·07)	Nil	Nil	22 (1·52)	2 (0·14)	Nil	Nil	15 (0·03)
		NP.	2290	8 (0·35)	Nil	Nil	Nil	6 (0·26)	Nil	7 (0·31)	Nil	5 (0·22)	Nil
		TOTAL	3740	38 (1·02)	20 (0·53)	1 (0·03)	Nil	6 (0·16)	22 (0·59)	9 (0·24)	Nil	5 (0·13)	15 (0·40)
	Biological	P	1450	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		N.P.	2290	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		TOTAL	3740	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

TABLE No. 5·3 (A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Wheat	Chemical	P	1450	30 (2·07)	Nil	1 (0·07)	Nil	7 (0·48)	Nil	12 (0·83)	11 (0·76)	Nil	Nil
		N.P.	2290	164 (7·16)	22 (0·96)	31 (1·35)	Nil	11 (0·48)	29 (1·27)	80 (3·49)	1 (0·04)	5 (0·72)	4 (0·17)
		TOTAL	3740	194 (5·19)	22 (0·59)	32 (0·86)	Nil	18 (0·48)	29 (0·78)	92 (2·46)	12 (0·32)	5 (0·13)	4 (0·11)
	Cultural	P	1450	13 (0·90)	Nil	Nil	1 (0·07)	Nil	Nil	3 (0·21)	Nil	Nil	Nil
		N.P.	2290	101 (4·41)	Nil	Nil	1 (0·04)	Nil	100 (4·37)	Nil	Nil	Nil	Nil
		TOTAL	3740	114 (3·05)	Nil	Nil	2 (0·05)	Nil	100 (2·67)	3 (0·08)	Nil	Nil	Nil
	Mechanical	P	1450	9 (0·62)	Nil	Nil	Nil	Nil	Nil	9 (0·62)	Nil	Nil	Nil
		N.P.	2290	69 (3·01)	35 (1·53)	Nil	Nil	4 (0·17)	30 (1·31)	3 (0·13)	Nil	3 (0·13)	Nil
		TOTAL	3740	78 (2·09)	35 (0·94)	Nil	Nil	4 (0·11)	30 (0·80)	12 (0·80)	Nil	3 (0·08)	Nil
	Biological	P	1450	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		N.P.	2290	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		TOTAL	3740	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

TABLE No. 5.3 (A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Sugarcane .	Chemical .	P . .	1450	46 (3·17)	Nil	Nil	6 (0·41)	Nil	9 (0·62)	32 (2·21)	Nil	1 (0·07)	Nil
		N.P. .	2290	32 (1·40)	Nil	Nil	Nil	1 (0·04)	4 (0·17)	28 (1·22)	Nil	1 (0·04)	Nil
		TOTAL .	3740	78 (2·09)	Nil	Nil	6 (0·16)	1 (0·03)	13 (0·35)	60 (1·60)	Nil	2 (0·05)	Nil
	Cultural .	P . .	1450	25 (1·72)	Nil	Nil	5 (0·34)	Nil	22 (1·52)	1 (0·07)	Nil	3 (0·21)	Nil
		N.P. .	2290	25 (1·09)	Nil	Nil	Nil	Nil	3 (0·13)	22 (0·96)	Nil	Nil	Nil
		TOTAL .	3740	50 (1·34)	Nil	Nil	5 (0·13)	Nil	25 (0·67)	23 (0·61)	Nil	3 (0·08)	Nil
	Mechanical .	P . .	1450	71 (4·90)	Nil	Nil	1 (0·07)	Nil	31 (2·14)	39 (2·67)	Nil	Nil	Nil
		N.P. .	2290	16 (0·70)	Nil	Nil	Nil	Nil	6 (0·26)	10 (0·43)	Nil	Nil	Nil
		TOTAL .	3740	87 (2·33)	Nil	Nil	1 (0·03)	Nil	37 (0·99)	49 (1·31)	Nil	Nil	Nil
	Biological .	P . .	1450	10 (0·69)	Nil	Nil	Nil	Nil	Nil	10 (0·69)	Nil	Nil	Nil
		N.P. .	2290	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		TOTAL .	3740	10 (0·27)	Nil	Nil	Nil	Nil	Nil	10 (0·27)	Nil	Nil	Nil

TABLE No. 5·3(A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Groundnut	Chemical	P	1450	10 (0·69)	Nil	Nil	Nil	Nil	Nil	10 (0·69)	Nil	Nil	Nil
		N.P.	2290	45 (1·97)	Nil	1 (0·04)	Nil	Nil	1 (0·04)	29 (1·27)	Nil	Nil	18 (0·79)
		TOTAL	3740	55 (1·47)	Nil	1 (0·03)	Nil	Nil	1 (0·03)	39 (1·04)	Nil	Nil	18 (0·48)
	Cultural	P	1450										
		N.P.	2290										
		TOTAL	3740					Nil					
	Mechanical	P	1450	Nil	Nil					Nil			
		N.P.	2290	21 (0·92)	21 (0·92)					Nil			
		TOTAL	3740	21 (0·56)	21 (0·56)					Nil			
	Biological	P	1450										
		N.P.	2290										
		TOTAL	3740					Nil					

TABLE No. 5·3 (A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Cotton	Chemical	P	1450	56 (3·86)	Nil	Nil	Nil	Nil	3 (0·21)	53 (3·66)	Nil	Nil	Nil
		N.P.	2290	65 (2·84)	Nil	Nil	Nil	Nil	2 (0·09)	60 (2·62)	Nil	Nil	Nil
		TOTAL	3740	121 (3·24)	Nil	Nil	Nil	Nil	5 (0·13)	113 (3·02)	Nil	Nil	Nil
	Cultural	P	1450										
		N.P.	2290										
		TOTAL	3740					Nil					
	Mechanical	P	1450	11 (0·76)	Nil	Nil	Nil	Nil	9 (0·62)	2 (0·14)	Nil	Nil	Nil
		N.P.	2290	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		TOTAL	3740	11 (0·29)	Nil	Nil	Nil	Nil	9 (0·24)	2 (0·05)	Nil	Nil	Nil
	Biological	P	1450										
		N.P.	2290										
		TOTAL	3740					Nil					

TABLE No. 5·3 (A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Coconut	Chemical	P	1450	85 (5·86)	Nil	Nil	Nil	Nil	8 (0·55)	77 (5·31)	Nil	Nil	Nil
		N.P.	2290	15 (0·66)	Nil	Nil	Nil	Nil	4 (0·17)	11 (0·48)	Nil	Nil	Nil
		TOTAL	3740	100 (2·67)	Nil	Nil	Nil	Nil	12 (0·32)	88 (2·35)	Nil	Nil	Nil
	Cultural	P	1450										
		N.P.	2290						Nil				
		TOTAL	3740										
	Mechanical	P	1450	64 (4·41)	Nil	Nil	Nil	Nil	62 (4·28)	2 (0·14)	Nil	Nil	Nil
		N.P.	2290	87 (3·80)	Nil	Nil	Nil	Nil	82 (3·58)	4 (0·17)	Nil	Nil	Nil
		TOTAL	3740	151 (4·04)	Nil	Nil	Nil	Nil	144 (3·85)	6 (0·16)	Nil	Nil	Nil
	Biological	P	1450										
		N.P.	2290					Nil					
		TOTAL	3740										

TABLE No. 5·3 (A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Arecanut	Chemical	P	1450	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
		N.P.	2290	123	Nil	Nil	Nil	Nil	63	60	Nil	Nil	Nil
				(5·37)					(2·75)	(2·62)			
		TOTAL	3740	123	Nil	Nil	Nil	Nil	63	60	Nil	Nil	Nil
				(3·29)					(1·68)	(1·60)			
	Cultural	P	1450										
		N.P.	2290					Nil					
		TOTAL	3740										
	Mechanical	P	1450										
		N.P.	2290					Nil					
		TOTAL	3740										
	Biological	P	1450										
		N.P.	2290					Nil					
		TOTAL	3740										

TABLE No. 5·3 (A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Fruit & Vegetables	Chemica	P	1450	131 (9·03)	Nil	Nil	18 (1·24)	3 (0·21)	25 (1·72)	104 (7·17)	Nil	20 (1·38)	Nil
		N.P.	2290	139 (6·07)	Nil	Nil	Nil	13 (0·57)	4 (0·17)	118 (5·15)	Nil	19 (0·83)	Nil
		TOTAL	3740	270 (7·22)	Nil	Nil	18 (0·48)	16 (0·43)	29 (7·75)	222 (5·94)	Nil	39 (1·04)	Nil
	Cultural	P	1450	Nil									
		N.P.	2290	4 (0·17)	Nil	Nil	4 (0·17)	Nil					
		TOTAL	3740	4 (0·11)	Nil	Nil	4 (0·11)	Nil					
	Mechanical	P	1450	25 (1·66)	Nil	Nil	1 (0·07)	Nil	21 (1·45)	3 (2·07)	Nil	Nil	Nil
		N.P.	2290	6 (0·26)	2 (0·09)	Nil	Nil	Nil	2 (0·09)	Nil	Nil	Nil	Nil
		TOTAL	3740	31 (0·82)	2 (0·05)	Nil	1 (0·03)	Nil	23 (0·61)	3 (0·08)	Nil	Nil	
	Biological	P	1450	Nil									
		N.P.	2290										
		TOTAL	3740										

TABLE NO. 5·3 (A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Other crops	Chemical	P	1450	56 (3·86)	Nil	1 (0·07)	Nil	3 (0·21)	Nil	49 (3·38)	Nil	Nil	Nil
		N.P.	2290	256 (11·18)	26 (1·14)	31 (1·35)	Nil	28 (1·22)	38 (1·66)	146 (6·38)	Nil	34 (1·48)	10 (0·44)
		TOTAL	3740	312 (8·34)	26 (0·70)	32 (0·86)	Nil	31 (0·83)	38 (1·02)	195 (5·21)	Nil	34 (0·91)	10 (0·27)
	Cultural	P	1450	2 (0·14)	Nil	Nil	1 (0·07)	Nil	Nil	1 (0·07)	Nil	Nil	Nil
		N.P.	2290	128 (5·59)	2 (0·09)	Nil	40 (1·75)	6 (0·26)	80 (3·49)	Nil	Nil	Nil	Nil
		TOTAL	3740	130 (3·48)	2 (0·05)	Nil	41 (1·10)	6 (0·16)	80 (2·14)	1 (0·03)	Nil	Nil	Nil
	Mechanical	P	1450	4 (0·28)	Nil	Nil	1 (0·07)	Nil	4 (0·29)	Nil	Nil	1 (0·07)	Nil
		N.P.	2290	123 (5·37)	77 (3·36)	7 (0·31)	1 (0·04)	1 (0·04)	33 (1·44)	5 (0·22)	1 (0·04)	1 (0·04)	1 (0·04)
		TOTAL	3740	137 (3·66)	77 (2·06)	7 (0·19)	2 (0·05)	1 (0·03)	37 (0·99)	5 (0·13)	1 (0·03)	2 (0·05)	1 (0·03)
	Biological	P	1450	Nil									
		N.P.	2290										
		TOTAL	3740										

TABLE NO. 5·3 (A)—*Concld.*

1	2	3	4	5	6	7	8	9	10	11	12	13	14
All crops	Chemical	P	1450	641 (44·21)	..	10 (1·86)	27 (1·86)	83 (5·72)	36 (2·48)	591 (40·76)	...	103 (7·10)	16 (1·10)
		N.P.	2290	887 (38·73)	54 (2·31)	48 (2·10)	6 (2·62)	37 (1·62)	89 (3·89)	739 (32·27)	2 (0·09)	31 (1·35)	49 (2·14)
		TOTAL	3740	1528 (40·86)	54 (1·44)	58 (1·55)	33 (0·88)	120 (3·21)	125 (3·34)	1330 (35·56)	2 (0·05)	134 (3·58)	65 (1·70)
	Cultural	P	1450	86 (5·93)	..	..	50 (3·45)	1 (0·02)	22 (1·52)	7 (0·48)	...	3 (0·21)	—
		N.P.	2290	228 (9·96)	2 (0·09)	..	65 (2·84)	8 (0·35)	118 (5·15)	34 (1·48)	...	..	...
		TOTAL	3740	314 (8·40)	2 (0·05)	...	115 (3·07)	9 (0·24)	140 (3·74)	41 (1·10)	..	3 (0·08)	—
	Mechanical	P	1450	234 (16·14)	79 (5·45)	1 (0·07)	57 (3·93)	2 (0·14)	104 (7·17)	61 (4·21)	50 (3·45)	2 (0·14)	18 (1·24)
		N.P.	2290	379 (16·55)	120 (5·24)	10 (0·44)	2 (0·09)	8 (0·35)	212 (9·26)	35 (1·53)	2 (0·08)	7 (0·31)	3 (0·13)
		TOTAL	3740	613 (16·39)	199 (5·32)	11 (0·29)	59 (1·58)	10 (0·27)	316 (8·45)	96 (2·57)	52 (1·39)	9 (0·24)	21 (0·56)
	Biological	P	1450	12 (0·83)	—	—	...	2 (0·14)	—	10 (0·69)	—	—	—
		N.P.	2290	1 (0·04)	...	...	...	...	...	1 (0·04)	—	—	—
		TOTAL	3740	13 (0·34)	..	—	..	2 (0·05)	...	11 (0·29)	...	...	...

TABLE NO. 5·4

Distribution of respondents reporting knowledge of curative plant protection measures from different agencies at different stages—crop-wise

Crop	Package & Non-package	Total No. of respon-dents	No. having knowledge of the measures	No. reporting agencies for acquiring knowledge	Storage stage			
					Govt.	Institution	Private	Others
1	2	3	4	5	6	7	8	9
Chemical Measures								
Paddy	Package . .	1450	463	453	7	--	--	1
	Non-package .	2290	619	604	52	--	--	25
	TOTAL . .	3740	1082	1057	59	--	--	27
Jowar	P. . . .	1450	4	4	--	--	--	--
	N. P. . . .	2290	37	30	9	--	--	4
	TOTAL . .	3740	41	34	9	--	--	4
Wheat	P. . . .	1450	30	20	1	--	--	--
	N. P. . . .	2290	164	163	45	--	--	8
	TOTAL . .	3740	194	183	46	--	--	8
All crops	P. . . .	1450	641	632	8	--	--	2
	N. P. . . .	2290	887	872	69	--	--	35
	TOTAL . .	3740	1528	1504	77	--	--	37

TABLE NO. 5·4—*Contd.*

Crop	Package & Non-package	Sowing stage				Standing crop stage			
		Govt.	Institutions	Private	Others	Govt.	Institutions	Private	Others
1	2	10	11	12	13	14	15	16	17
Chemical Measures									
Paddy	Package	37	2	6	39	289	...	7	169
	Non-package	12	...	...	3	308	7	1	290
	TOTAL	49	2	6	42	597	7	8	459
Jowar	P.	...	...	...	...	3	...	...	1
	N. P.	1	...	...	...	16	...	...	1
	TOTAL	1	...	...	...	19	...	...	2
Wheat	P.	7	...	...	...	11	...	...	1
	N. P.	6	..	...	5	56	...	4	49
	TOTAL	13	..	...	5	67	...	4	50
All crops	P.	37	2	6	66	432	3	10	241
	N. P.	24	..	..	20	461	8	12	435
	TOTAL	61	2	6	86	893	11	22	676

TABLE NO. 5·4—*Contd.*

1	2	3	4	5	6	7	8	9
Cultural Measures								
Paddy	P. . . .	1450	60	51	—	—	—	—
	N. P. . . .	2290	95	94	—	—	—	—
	TOTAL . .	3740	155	145	—	—	—	—
Jowar	P. . . .	1450	—	—	—	—	—	—
	N. P. . . .	2290	4	4	—	—	—	—
	TOTAL . .	3740	4	4	—	—	—	—
Wheat	P. . . .	1450	13	4	—	—	—	—
	N. P. . .	2290	101	101	—	—	—	—
	TOTAL . . .	3740	114	105	—	—	—	—
All crops	P. . . .	1450	86	77	—	—	—	—
	N. P. . . .	2290	228	227	—	—	—	—
	TOTAL . .	3740	314	304	—	—	—	—

TABLE NO. 5-4—*Contd.*

1	2	10	11	12	13	14	15	16	17
Cultural Measures									
Paddy	P. . . .	2	..	..	44	5	..	..	..
	N. P. . . .	..	..	..	71	4	..	..	20
	TOTAL . .	2	..	..	115	9	..	..	20
Jowar	P. . . .	..	..	..	..	..	..	..	..
	N. P. . . .	..	..	..	..	4	..	..	..
	TOTAL . .	..	..	..	..	4	..	..	..
Wheat	P. . . .	..	..	..	..	1	2	..	..
	N. P. . . .	..	..	..	..	1	..	..	100
	TOTAL . .	..	..	..	..	2	3	..	100
All crops	P. . . .	..	2	..	49	7	..	..	22
	N. P. . . .	2	1	..	73	22	2	..	129
	TOTAL . .	2	3	..	122	29	2	..	151

TABLE NO. 5·4—*Contd.*

1	2	3	4	5	6	7	8	9
Mechanical Measures								
Paddy	P. . . .	1450	98	98	—	—	—	80
	N. P. . . .	2290	213	211	1	—	—	109
	TOTAL . .	3740	311	309	1	—	—	189
Jowar	P. . . .	1450	30	30	..	—	—	21
	N. P. . . .	2290	8	8	—	—	..	..
	TOTAL . .	3740	38	38	..	—	..	21
Wheat	P. . . .	1450	9	9	—	—	—	—
	N. P. . . .	2290	69	69	..	—	—	35
	TOTAL . .	3740	78	78	..	—	..	35
All crops	P. . . .	1450	234	234	—	—	—	80
	N. P. . . .	2290	379	377	1	—	..	131
	TOTAL . .	3740	613	611	1	—	—	211

TABLE NO. 5·4—*Contd.*

1	2	10	11	12	13	14	15	16	17
Mechanical Measures									
Paddy	P.	1	..	..	56	5	..	..	26
	N. P.	..	..	..	1	3	..	..	99
	TOTAL	1	..	..	57	8	..	..	125
Jowar	P.	..	..	..	..	..	..	..	24
	N. P.	6	..	..	..	6	..	..	1
	TOTAL	6	..	..	..	6	..	..	25
Wheat	P.	..	..	..	..	9	..	..	..
	N. P.	4	..	..	..	5	..	..	28
	TOTAL	4	..	..	..	14	..	..	28
All crops	P.	1	..	..	59	38	2	1	131
	N. P.	8	..	..	2	29	1	..	219
	TOTAL	9	..	..	6	67	3	1	350

TABLE NO. 5·5

Distribution of respondents adopting preventive plant protection measures, crop-wise

State	Package & Non-package	Paddy			Jowar			Wheat		
		No. growing the crop	No. taking PP. measures	No. taking recom-mended measures	No. growing the crop	No. taking P.P. measures	No. taking recom-mended measures	No. growing the crop	No. taking P.P. measures	No. taking recom-menddd measures
1	2	3	4	5	6	7	8	9	10	11
Andhra Pradesh .	Package .	100	18	16	..	..	..	..	..	..
	Non-Package. .	174	71	2	49	..	..	..	..	..
	TOTAL . .	274	89	18	49	..	..	..	..	..
Assam . . .	P. . .	100	..	..	..	..	..	..	..	..
	N. P. . .	19	..	..	..	..	..	..	..	..
	TOTAL . .	119	..	..	..	..	..	..	..	..
Bihar . . .	P. . .	90	5	..	..	..	..	90	4	..
	N. P. . .	74	..	..	..	..	..	50	..	..
	TOTAL . .	164	5	..	..	..	..	140	4	..
Gujarat . . .	P. . .	43	1	..	3	1	1	4	..	..
	N. P. . .	..	..	..	84	..	..	53	..	..
	TOTAL . .	43	1	..	87	1	1	57	..	..
J. & K. . . .	P. . .	50	43	..	..	..	..	..	..	..
	N. P. . .	..	..	..	..	..	..	..	..	..
	TOTAL . .	50	43	..	..	..	..	..	..	..

ABLE NO. 5-5—*Contd.*

State	Package & Non-package	Groundnut			All crops		
		No. growing the crops	No. taking P.P. measures	No. taking recommended measures	No. growing the crop	No. taking P. P. measures	No. taking recommended measures
1	2	12	13	14	15	16	17
Andhra Pradesh	Package	..	..	..	100	18	16
	Non-Package	67	28	..	185	78	4
	TOTAL	67	28	..	285	96	20
Assam	Package	..	..	..	100	..	..
	Non-Packages	..	..	..	20	..	..
	TOTAL	..	..	..	120	..	..
Bihar	Package	..	..	..	90	5	4
	Non-Package	..	..	..	90	..	..
	TOTAL	..	..	..	180	5	4
Gujarat	Package	..	..	..	48	2	1
	Non-Package	91	..	..	98	..	..
	TOTAL	91	..	..	146	2	1
J. & K.	Package	..	..	..	50	43	43
	Non-Package	..	..	..	..	..	..
	TOTAL	..	..	..	50	43	43

TABLE NO. 5·3—*Contd.*

1	2	3	4	5	6	7	8	9	10	11
Kerala . . .	Package .	66	33	25	..	..	..	..	..	..
	Non-Package .	33	..	..	..	..	..	..	..	..
	TOTAL . .	99	33	25	..	..	..	..	..	..
M. P. . . .	Package .	100	..	..	..	..	..	..	..	..
	Non-Package .	3	..	..	50	2	..	67	4	4
	TOTAL . .	103	..	..	50	2	..	67	4	4
Madras . . .	Package .	52	3	4	..	..	..	..	..	..
	Non-Package .	52	..	..	..	..	..	..	..	..
	TOTAL . .	104	3	4	..	..	..	..	..	..
Maharashtra . .	Package .	100	..	..	..	..	..	..	..	..
	Non-Package .	65	1	..	73	3	..	10	1	..
	TOTAL . .	165	1	..	73	3	..	10	1	..
Mysore . . .	Package .	95	36	2	..	..	..	..	..	..
	Non-Package .	121	26	2	56	1	..	..	..	..
	TOTAL . .	216	62	4	56	1	..	..	..	..
Orissa . . .	Package .	100	..	..	..	..	..	..	..	..
	Non-Package .	..	..	..	..	..	..	..	..	..
	TOTAL . .	100	..	..	..	..	..	..	..	..
Punjab . . .	Package .	..	..	..	..	..	..	41	..	..
	Non-Package .	59	..	..	2	..	..	94	..	..
	TOTAL . .	59	..	..	2	..	..	135	..	..

TABLE NO. 5·5—*Contd.*

1	2	12	13	14	15	16	17
Kerala	Package	..	..	..	89	37	43
	Non-Package	..	..	..	40	..	..
	TOTAL	..	..	..	129	37	43
M. P.	Package	..	..	..	100	..	..
	Non-Package	54	1	..	101	5	4
	TOTAL	54	1	..	201	5	4
Madras	Package	1	..	..	52	3	4
	Non-Package	9	..	..	52	..	..
	TOTAL	10	..	..	104	3	4
Maharashtra	Package	..	..	..	100	..	..
	Non-Package	34	1	..	157	3	2
	TOTAL	34	1	..	257	3	2
Mysore	Package	7	..	..	98	37	36
	Non-Package	10	1	1	178	29	28
	TOTAL	17	1	1	276	66	64
Orissa	Package	..	..	..	100	..	..
	Non-Package	..	..	..	..	..	..
	TOTAL	..	..	..	100	..	..
Punjab	Package	22	..	..	78	6	6
	Non-Package	..	..	..	100	..	..
	TOTAL	22	..	..	178	6	6

TABLE NO. 5·5—*Contd.*

1	2	3	4	5	6	7	8	9	10	11
Rajasthan . . .	Package .	..	..	..	50	..	..	66	..	..
	Non-Package .	..	..	..	15	..	..	121	..	..
	TOTAL . .	..	..	..	65	..	..	187	..	..
U. P. . . .	Package .	18	..	..	32	..	..	82	..	..
	Non-Package .	120	..	..	19	..	..	223	1	..
	TOTAL . .	138	..	..	51	..	..	305	1	..
West Bengal . .	Package .	99	..	..	..	..	..	..	..	..
	Non-Package .	80	3	2	..	..	..	..	..	..
	TOTAL . .	179	3	2	..	..	..	..	..	..
M. P. . . .	Package .	..	..	..	..	..	..	..	..	..
	Non-Package .	42	1	..	..	..	..	92	1	1
	TOTAL . .	42	1	..	..	..	..	92	1	1
All India . . .	Package .	1013	139	47	85	1	1	283	4	..
	Non-Package .	842	102	6	348	6	..	710	7	5
	TOTAL . .	1855	241	53	433	7	1	993	11	5

TABLE NO. 5·5—*Contd.*

1	2	12	13	14	15	16	17
Rajasthan . . .	Package .	..	...	...	88	...	...
	Non-Package .	..	...	...	133	...	...
	TOTAL . .	..	...	...	221	...	...
U. P. . . .	Package .	..	...	...	95	...	...
	Non-Package .	..	...	...	295	1	...
	TOTAL . .	..	..	..	390	1	...
West Bengal . . .	Package .	..	..	...	102	..	..
	Non-Package .	..	..	..	80	3	2
	TOTAL . .	..	..	..	182	3	2
M. P.	Package .	..	..	...	..	..	...
	Non-Package .	1	...	..	93	1	1
	TOTAL . .	1	..	..	93	1	1
All India	Package .	30	...	..	1290	151	143
	Non-Package .	266	31	1	1622	120	41
	TOTAL . .	296	31	1	2912	271	184

TABLE NO. 5·6

Distribution of respondents adopting preventive plant protection measures by types of measures

Crop	Package/ Non-package	No. growing the crop	No. of persons taking measures		
			Chemical	Cultural	Mechanical
1	2	3	4	5	6
Paddy	Package	1013	47	29	1
	Non-Package	842	6	77	..
	All areas	1855	53	106	1
Jowar	Package	85	1	5	..
	Non-Package	348	..	8	..
	All areas	433	1	13	..
Wheat	Package	283	..	7	..
	Non-Package	710	2	7	..
	All areas	993	2	14	..
Groundnut	Package	30	..	..	..
	Non-Package	266	1	38	..
	All areas	296	1	38	..
All crops	Package	1290	64	72	51
	Non-Package	1622	39	97	..
	All areas	2912	103	169	51

TABLE NO. 5·7

Distribution of respondents reporting reasons for non-adoption of preventive plant protection measures, State-wise

State	Package and Non-package	No. of reasons reported by respon-dents	No know-ledge	No supply of P. P. materials	No advice	Seed taken from others	Others did not take up	Not convinced of utility	Other reasons
1	2	3	4	5	6	7	8	9	10
Andhra Pradesh	Package	94	29	..	7	..	8	7	58
	Non-Package	136	92	..	3	1	19	2	33
	TOTAL	230	121	..	10	1	27	9	91
Assam	Package	100	100	..	..	..	..	..	..
	Non-Package	20	17	1	12	..	..	1	1
	TOTAL	120	117	1	12	..	..	1	1
Bihar	Package	90	61	4	..	..	22	20	10
	Non-Package	90	13	..	1	..	9	..	91
	TOTAL	180	74	4	1	..	31	20	101
Gujarat	Package	47	46	..	1	..	32	..	1
	Non-Package	98	88	..	11	..	..	..	..
	TOTAL	145	134	..	12	..	32	..	1
J. & K.	Package	38	38	..	..	..	..	..	3
	Non-Package	..	..	..	..	..	..	..	..
	TOTAL	38	38	..	..	..	..	..	3

TABLE NO. 5·7—*Contd.*

1	2	3	4	5	6	7	8	9	10
Kerala	Package .	87	48	1	1	..	17	36	27
	Non-Package .	39	38	..	..	..	..	..	1
	TOTAL . .	126	86	1	1	..	17	36	28
M. Pradesh	Package .	100	100	..	26	..	..	..	..
	Non-Package .	100	97	..	..	1	3	1	4
	TOTAL . .	200	197	..	26	1	3	1	4
Madras	Package .	50	50	..	..	..	..	..	..
	Non-Package .	52	50	..	1	1	..	..	3
	TOTAL . .	102	100	..	1	1	..	..	3
Maharashtra	Package .	100	93	..	..	..	..	..	7
	Non-Package .	157	145	1	..	..	1	7	59
	TOTAL . .	257	238	1	..	..	1	7	66
Mysore	Package .	98	87	..	7	1	..	..	20
	Non-Package .	175	124	..	48	4	2	8	1
	TOTAL . .	273	211	..	55	5	2	8	21
Orissa	Package .	99	97	..	..	..	1	..	1
	Non-Package .	..	..	..	..	..	..	..	..
	TOTAL . .	99	97	..	..	..	1	..	1

TABLE NO. 5·7—*Contd.*

1	2	3	4	5	6	7	8	9	10
Punjab	Package	76	64	..	..	..	..	1	58
	Non-Package	100	100	..	..	..	..	..	2
	TOTAL	176	164	..	..	..	..	1	60
Rajasthan	Package	87	86	..	1	..	..	1	..
	Non-Package	132	130	1	3	..	..	..	1
	TOTAL	219	216	1	4	..	..	1	1
U. Pradesh	Package	95	94	..	..	..	1	..	..
	Non-Package	294	292	..	94	2	1	8	28
	TOTAL	389	386	..	94	2	2	8	28
W. Bengal	Package	102	102	..	..	..	2	..	2
	Non-Package	80	80	..	..	..	..	..	..
	TOTAL	182	182	..	..	..	2	..	2
H. Pradesh	Package	..	..	..	..	..	..	..	..
	Non-Package	93	92	..	1	..	29	..	4
	TOTAL	93	92	..	1	..	29	..	4
All India	Package	1263	1095	5	43	1	83	65	187
	Non-Package	1566	1358	3	164	9	64	27	228
	TOTAL	2829	2453	8	207	10	147	92	415

TABLE No. 5·7(A)

Distribution of respondents reporting reasons for non-adoption of preventive plant protection measures, crop-wise

Crop	Package/ Non-package	No of respon-dents report-ing reasons	No know-ledge	No supply of P.P. materials	No advice	Seed taken from others	Others did not take up	Not convinced of utility	Other reasons
1	2	3	4	5	6	7	8	9	10
Paddy	Package .	963	802	4	42	1	67	45	95
	Non-Package .	791	622	..	26	3	40	11	165
	TOTAL . .	1754	1424	4	68	4	107	56	260
Jowar	Package .	84	83	...	...	...	..	...	1
	Non-Package .	345	273	1	62	4	10	7	9
	TOTAL . .	429	356	1	62	4	10	7	10
Wheat	Package .	281	229	2	1	...	24	5	23
	Non-Package .	698	630	1	96	...	28	1	66
	TOTAL . .	979	859	3	97	...	52	6	89
G. Nut	Package .	29	16	..	...	...	..	...	13
	Non-Package .	237	205	1	15	3	6	4	7
	TOTAL . .	266	221	1	15	3	6	4	20
All Crops	Package .	1263	1095	5	42	1	83	65	187
	Non-Package .	1566	1358			9	64	27	228
	TOTAL . .	2829				0	147	92	415

TABLE

Percentage distribution of selected respondents noticing pests/diseases on ... ve measures, State-wise

State	Package								Total			
	% of respondents on whose farms pests/diseases were noticed	Among respondents noticing pests/diseases, % reporting			% of respondents on whose farms pests/diseases were noticed	Among respondents noticing pests/diseases, % reporting			% of respondents on whose farms pests/diseases were noticed	Among respondents noticing pests/diseases, % reporting		
		Taking any treatment	Taking recommended treatment	Taking measures in time		Taking any treatment	Taking recommended treatment	Taking measures in time		Taking any treatment	Taking recommended treatment	Taking measures in time
1	2	3	4	5	6	7	8	9	10	11	12	13
Andhra Pradesh	41·0	51·2	46·3	43·9	73·0	29·4	27·3	28·1	62·3	34·2	31·5	31·6
Assam	10·0	10·0	10·0	10·0	66·0	6·0	3·0	4·5	38·0	6·5	3·9	5·3
Bihar	56·0	0·0	0·0	0·0	36·0	0·0	0·0	0·0	46·0	0·0	0·0	0·0
Gujarat	50·0	14·0	6·0	8·0	97·9	5·1	4·1	5·2	73·8	8·1	4·7	6·1
J. & K.	88·0	47·7	38·6	47·7	0·0	0·0	0·0	0·0	88·0	47·7	38·6	47·7
Kerala	94·9	86·1	81·9	85·1	90·0	93·3	82·2	93·3	92·4	89·6	82·0	89·1
M. Pradesh	1·0	0·0	0·0	0·0	37·2	6·4	0·9	0·9	27·9	6·4	0·9	0·9
Madras	25·0	24·0	24·0	24·0	46·0	63·0	36·9	60·9	35·5	49·2	32·3	47·9
Maharashtra	16·0	56·2	0·0	6·3	92·5	2·7	2·1	1·6	67·0	6·9	1·9	2·0
Mysore	85·8	42·3	36·4	42·4	84·1	53·6	52·4	50·0	84·6	49·7	46·9	47·4
Orissa	84·0	4·7	4·7	3·6	68·3	16·4	14·9	14·9	76·2	9·9	9·2	8·6
Punjab	95·9	45·7	37·2	42·6	52·0	26·9	26·9	26·9	73·7	39·0	33·5	37·0
Rajasthan	55·7	26·4	18·8	24·5	84·7	3·5	2·9	3·6	75·3	9·0	6·8	8·6
U. Pradesh	59·0	6·7	1·6	6·8	81·0	46·9	11·1	46·1	75·5	39·0	9·2	38·4
West Bengal	38·0	10·5	2·6	10·5	30·0	18·5	14·8	18·5	34·2	13·8	7·6	13·8
H. Pradesh	0·0	0·0	0·0	0·0	52·0	3·8	0·0	0·0	52·0	3·8	0·0	0·0
All States	52·0	33·4	27·3	30·8	68·1	26·9	18·6	25·5	61·8	29·0	21·4	27·2

TABLE No. 5·8(A)

Percentage distribution of selected respondents noticing pests/diseases of their farms and reporting curative measures, crop-wise

Crop	Package/Non-Package	Percent of farmers on whose farms any pests/diseases were noticed	Among the respondents noticing pests/diseases in their farms, percentage reporting		
			Taking any measures	Taking recommended treatment	Any measures taken timely
1	2	3	4	5	6
Paddy	Package	37·9	28·1	19·9	24·9
	Non-Package	51·1	31·5	28·3	29·9
	TOTAL	45·3	30·3	25·2	28·1
Jowar	Package	31·3	6·2	0·0	--
	Non-Package	40·3	0·0	0·0	--
	TOTAL	38·6	0·9	0·0	--
Wheat	Package	31·8	1·2	0·0	1·2
	Non-Package	42·8	24·4	0·5	23·6
	TOTAL	40·1	20·0	0·4	19·3
Sugarcane	Package	59·0	37·1	35·7	36·4
	Non-Package	55·1	·1	5·5	8·6
	TOTAL			18·1	20·2

TABLE No. 5·8(A)—*Contd.*

1	2				
Groundnut	Package	34·7	6·2	0·0	31·3
	Non-Package	59·2	3·3	2·7	1·4
	TOTAL	52·6	3·8	2·2	1·7
Cotton	Package	58·6	19·6	8·9	17·9
	Non-Package	70·9	2·0	1·6	2·0
	TOTAL	66·6	7·4	3·8	6·9
Coconut	Package	91·7	80·8	78·6	78·7
	Non-Package	85·1	97·5	78·7	97·5
	TOTAL	88·4	88·7	78·6	87·6
Arecanut	Package	0·0	0·0	0·0	—
	Non-Package	25·5	75·0	70·8	70·8
	TOTAL	25·5	75·0	70·8	70·8
Fruits & Vegetables	Package	44·3	32·0	26·4	32·1
	Non-Package	37·4	17·6	15·9	15·9
	TOTAL	40·4	24·6	21·0	23·7
Other crops	Package	39·3	7·6	3·5	64·3
	Non-Package	36·4	8·5	4·5	7·1
	TOTAL	37·2	8·2	4·2	6·9
All crops	Package	52·0	33·4	27·3	30·8
	Non-Package	68·1	29·9	18·6	25·5
	TOTAL	61·8	29·0	21·4	27·2

TABLE No. 5·9

Percentage distribution of respondents taking plant protection curative measures by year of first adoption and types of measures taken

State	Package/ Non-package	Among the respondents taking the measures, percentage adopting for the first time during						Adopting the various types of measures for the first adoption			
		55-56	56-57	57-58	58-59	59-60	60-61	Chemical	Cultural	Mechanical	Biological
1	2	3	4	5	6	7	8	9	10	11	12
Andhra Pradesh	P	0·0	15·3	15·3	15·3	23·0	30·7	92·3	0·0	15·3	0·0
	N. P.	0·0	0·0	10·0	5·0	10·0	35·0	100·0	0·0	0·0	0·0
	TOTAL	0·0	6·0	12·1	9·0	15·1	33·3	96·9	0·0	6·0	0·0
Assam	P	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0
	N. P.	0·0	16·6	0·0	0·0	33·3	50·0	100·0	0·0	0·0	0·0
	TOTAL	0·0	16·6	0·0	0·0	33·3	50·0	100·0	0·0	0·0	0·0
Gujarat	P	0·0	30·0	0·0	10·0	40·0	10·0	100·0	0·0	10·0	0·0
	N. P.	0·0	0·0	0·0	0·0	50·0	50·0	100·0	0·0	0·0	0·0
	TOTAL	0·0	21·4	0·0	7·1	42·8	21·4	100·0	0·0	7·1	0·0
J. & K.	P.	90·0	0·0	0·0	0·0	0·0	0·0	22·0	90·0	6·0	0·0
	N. P.	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0
	TOTAL	90·0	0·0	0·0	0·0	0·0	0·0	22·0	90·0	6·0	0·0
Kerala	P.	72·2	1·2	3·6	7·2	4·8	4·8	79·5	0·0	79·5	0·0
	N. P.	60·5	3·9	5·2	5·2	9·2	14·4	75·0	0·0	63·1	0·0
	TOTAL	66·6	2·5	4·4	6·2	6·9	9·4	77·3	0·0	71·6	0·0

TABLE No. 5·9—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12
Madhya Pradesh	P.	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0
	N. P.	0·0	0·0	0·0	0·0	66·6	33·3	33·3	0·0	33·3	0·0
	TOTAL	0·0	0·0	0·0	0·0	66·6	33·3	33·3	0·0	33·3	0·0
Madras	P.	0·0	0·0	0·0	0·0	0·0	100·0	100·0	0·0	0·0	0·0
	N.P.	6·2	0·0	0·0	3·1	65·6	25·0	100·0	0·0	0·0	0·0
	TOTAL	6·0	0·0	0·0	3·0	63·6	27·2	100·0	0·0	0·0	0·0
Maharashtra	P.	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0
	N. P.	16·6	0·0	16·6	0·0	33·3	33·3	100·0	0·0	0·0	0·0
	TOTAL	16·6	0·0	16·6	0·0	33·3	33·3	100·0	0·0	0·0	0·0
Mysore	P.	25·0	2·7	5·5	8·3	33·3	11·1	41·6	33·3	8·3	19·4
	N.P.	40·8	15·3	13·2	5·1	1·0	0·0	100·0	0·0	0·0	0·0
	TOTAL	36·5	11·9	11·9	5·9	9·7	2·9	84·3	8·9	2·2	5·2
Orissa	P.	0·0	0·0	0·0	0·0	0·0	85·7	100·0	0·0	0·0	0·0
	N.P.	11·1	11·1	11·1	11·1	11·1	22·2	88·8	0·0	0·0	0·0
	TOTAL	4·3	4·3	4·3	4·3	4·3	60·8	95·6	0·0	0·0	0·0
Punjab	P.	17·2	3·4	13·7	6·8	3·4	55·1	72·4	0·0	38·9	0·0
	N.P.	10·0	20·0	20·0	30·0	10·0	10·0	100·0	0·0	0·0	0·0
	TOTAL	15·3	7·6	15·3	12·8	5·1	43·5	79·4	0·0	28·2	0·0
Rajasthan	P.	0·0	0·0	0·0	50·0	50·0	0·0	100·0	0·0	0·0	0·0
	N.P.	0·0	0·0	0·0	50·0	0·0	37·5	100·0	0·0	0·0	0·0
	TOTAL	0·0	0·0	0·0	50·0	10·0	30·0	100·0	0·0	0·0	0·0

TABLE No. 5·9—*Contd.*

1	2	3	4	5	6	7	8	9	10	11	12
Uttar Pradesh . . .	P. . .	0·0	0·0	0·0	0·0	0·0	0·0	100·0	0·0	0·0	0·0
	N.P. . .	54·2	10·5	6·3	7·7	16·1	4·2	38·7	61·9	1·4	0·0
	TOTAL . .	53·8	10·4	6·2	7·6	16·0	4·1	39·1	61·5	1·3	0·0
West Bengal . . .	P. . .	16·6	0·0	0·0	16·6	0·0	66·6	66·6	0·0	33·3	0·0
	N.P. . .	0·0	0·0	0·0	59·0	36·3	4·5	100·0	0·0	0·0	0·0
	TOTAL . .	3·5	0·0	0·0	50·0	28·5	17·8	92·0	0·0	7·1	0·0
All India	P. . .	48·9	3·2	4·4	6·5	10·2	18·7	64·0	23·2	35·9	2·8
	N.P. . .	38·5	8·4	7·3	9·8	16·5	10·7	75·0	20·2	11·6	0·0
	TOTAL . .	42·2	6·6	6·3	8·6	14·2	13·0	71·0	21·2	20·4	1·0

TABLE No. 5·10

Distribution of respondents according to reasons for not taking P.P. curative measures, crop-wise

Crops	No not taking P. P. Measures though diseases noticed	Distribution of respondents not taking P. P. Curative Measures, reason wise												
		Package						Non-Package						
		No knowledge of precaution	Knowledge but no supply of chemical & equipment	Too late to take precautions	Others did not take	Not convinced of the utility of the treatment	Others	No not taking P.P. Measures though diseases noticed	No knowledge of precaution	Knowledge but no supply of chemical & equipment	Too late to take precaution.	Others did not take	Not convinced of the utility of the treatment	Others
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Paddy . .	308	194	18	2	28	27	60	504	449	6	12	21	22	61
Jowar . .	31	19	..	..	4	..	14	172	168	1	..	4	7	11
Wheat . .	77	28	1	..	17	9	32	247	237	..	..	4	4	8
Sugarcane .	90	73	..	..	1	5	12	171	147	2	..	..	21	3
Groundnut .	29	20	..	..	3	..	9	143	130	1	..	3	7	5
Cotton . .	90	58	..	1	3	2	29	236	221	1	..	2	6	13
Coconut . .	64	9	..	..	..	48	17	2	2	..	..	..	..	..
Arecanut . .	..	..	..	..	..	..	..	4	..	..	1	..	2	1
Fruit and Vegetables . .	81	65	1	..	1	3	14	92	78	..	2	10	..	3
Other crops .	158	111	1	..	8	4	40	389	369	2	1	7	13	24
All crops .	635	413	19	3	44	85	173	1229	1151	10	15	39	60	98

TABLE No. 5·10(A)

Distribution of respondents according to reasons for not taking plant protection curative measures, number reporting according to size group of holding.

Size group of holding (in hectares)	Number not taking P. P. measures though diseases noticed	Distribution of respondents not taking P. P. Curative Measures, reason-wise					
		No know-ledge of precau-tions	Know-ledge but no supply of chemicals & equip-ments	Too late to take precau-tions	Others did not take	Not con-vinced of the utility of the treatment	Others
1	2	3	4	5	6	7	8
Package							
0·196 to 1·006	171	119	4	2	7	24	37
1·01 to 4·036	306	208	14	..	20	32	73
4·04 to 8·086	99	55	1	..	8	23	31
8·09 to 20·226	50	28	..	2	9	5	24
20·23 and above	9	3	..	..	..	1	6
All groups	635	413	19	3	44	85	171
Non-Package							
0·196 to 1·006	305	271	2	6	7	15	32
1·01 to 4·036	533	510	6	6	20	23	45
4·04 to 8·086	223	211	1	1	5	16	12
8·09 to 20·226	147	139	1	2	6	6	7
20·23 and above	21	20	..	..	1	..	2
All groups	1229	1151	10	15	39	60	98
Package and non-package							
0·196 to 1·006	476	390	6	8	14	39	69
1·01 to 4·036	839	718	20	6	40	55	118
4·04 to 8·086	322	266	2	1	13	39	43
8·09 to 20·226	197	167	1	3	15	11	31
20·23 and above	30	23	..	..	1	1	8
All groups	1864	1564	29	18	83	145	269

TABLE No. 5·11

Distribution of respondents reporting adoption of preventive and curative plant protection measures in VLW H.Q. villages and non-VLW HQ-villages

State	Preventive Plant Protection Measures				Curative Plant Protection Measures			
	VLW HQ. Villages		Non-VLW HQ. Villages		VLW HQ. Villages		Non-VLW HQ. Villages	
	No. of relevant culti-vators	No. adopting the measures	No. of relevant culti-vators	No. adopting the measures	No. report-ing Pests/ diseases	No. adopting the measures	No. report-ing Pests/ diseases	No. adopting the measures
1	2	3	4	5	6	7	8	9
1. Andhra Pradesh	54	21	231	91	36	19	151	45
2. Assam	20	..	100	..	19	..	57	5
3. Bihar	30	..	150	5	19	..	73	..
4. Gujarat	30	8	116	3	30	3	117	9
5. J. & K.	10	7	40	36	6	3	38	18
6. Kerala	18	3	111	31	37	31	147	134
7. Madhya Pradesh	40	5	161	..	18	..	91	7
8. Madras	22	1	82	4	16	10	55	25
9. Maharashtra	49	1	208	8	36	2	165	12
10. Mysore	50	17	226	53	39	29	210	95
11. Orissa	20	..	80	1	28	5	123	10
12. Punjab	30	..	148	7	25	18	121	39
13. Rajasthan	44	2	177	7	52	3	169	17
14. U. Pradesh	80	..	310	1	55	27	247	91
15. West Bengal	41	..	141	4	11	2	54	7
16. H. Pradesh	27	..	66	2	10	2	42	..
All States	565	65	2347	253	437	154	1860	514

TABLE No. 5·12

Coverage of area under plant protection preventive and curative measures

State	Package/ Non-package	Total gross cropped area of the respondents	Percentage of area covered under P. P. measures		Average area (Gross) covered by P. P. measures per adopting cultivator, crop-wise for					
			Preventive	Curative	Paddy		Ground Nut		All crops	
					Preventive	Curative	Preventive	Curative	Preventive	Curative
1	2	3	4	5	6	7	8	9	10	11
Andhra Pradesh	P	550·58	4·35	17·47	1·33	4·9	0·00	0·0	1·33	4·6
	NP	633·94	43·88	7·70	2·91	1·1	0·83	0·1	3·57	1·1
	TOTAL	1184·52	25·50	12·24	2·59	2·6	0·83	0·1	3·15	2·3
Assam	P	189·10	0·00	0·05	0·00	0·1	0·00	0·0	0·00	0·1
	NP	227·31	0·00	0·44	0·00	0·4	0·00	0·0	0·00	0·2
	TOTAL	416·41	0·00	0·26	0·00	0·3	0·00	0·0	0·00	0·2
Bihar	P	519·53	0·77	0·00	0·00	0·0	0·00	0·0	0·80	0·0
	NP	217·54	0·00	0·00	0·00	0·0	0·00	0·0	0·00	0·0
	TOTAL	737·07	0·54	0·00	0·00	0·0	0·00	0·0	0·80	0·0
Gujarat	P	348·22	0·69	1·00	0·00	0·3	0·00	0·7	1·20	0·5
	NP	950·52	0·00	1·14	0·00	0·0	0·00	8·7	0·00	2·2
	TOTAL	1298·74	0·18	1·11	0·00	0·3	0·00	3·4	1·20	1·2
J. & K.	P	78·58	9·30	7·64	0·00	0·1	0·00	0·0	1·70	0·3
	NP	N. R.	..	..	..	..	..	..	..	..
	TOTAL	78·58	9·30	7·64	0·00	0·1	0·00	0·0	1·70	0·3

TABLE No. 5·12—*Contd.*

1	2	3	4	5	6	7	8	9	10	11
Kerala	P .	287·98	137·56	101·71	11·98	5·5	0·00	0·0	10·71	3·6
	NP .	220·77	0·00	23·06	0·00	0·6	0·00	0·0	0·00	0·7
	TOTAL	508·75	77·87	67·60	11·98	3·2	0·00	0·0	10·71	2·1
M. Pradesh	P .	305·21	0·00	0·00	0·00	0·0	0·00	0·0	0·00	0·0
	NP .	1065·79	0·22	0·31	0·00	0·0	0·00	1·7	0·48	0·5
	TOTAL	1371·00	0·17	0·25	0·00	0·0	0·00	1·7	0·48	0·5
Madras	P .	373·43	4·41	3·45	5·49	2·1	0·00	0·0	5·49	2·1
	NP .	381·31	0·00	22·50	0·00	3·0	0·00	0·0	0·00	3·0
	TOTAL	754·74	2·18	13·08	5·49	2·8	0·00	0·0	5·49	2·8
Maharashtra . . .	P .	313·00	0·00	0·38	0·00	0·1	0·00	0·0	0·00	0·1
	NP .	930·13	2·12	1·31	0·00	0·7	0·00	0·0	6·59	2·4
	TOTAL	1243·13	1·58	1·09	0·00	0·2	0·00	0·0	6·59	1·0
Mysore	P .	279·15	11·31	9·18	0·02	0·9	0·00	0·0	0·85	0·7
	NP .	957·02	2·97	12·64	0·37	1·3	1·60	3·2	0·98	1·4
	TOTAL	1236·17	4·86	11·86	0·17	1·3	1·60	3·2	0·91	1·2
Orissa	P .	127·15	0·00	4·72	0·00	1·5	0·00	0·0	0·00	1·5
	NP .	237·44	0·00	2·36	0·00	0·7	0·00	0·0	0·00	0·5
	TOTAL	364·59	0·00	3·84	0·00	1·1	0·00	0·0	0·00	0·8
Punjab	P .	653·87	0·54	6·26	0·00	0·0	0·00	0·0	0·61	0·9
	NP .	675·14	0·00	0·80	0·00	0·3	0·00	0·0	0·00	0·4
	TOTAL	1329·01	0·28	3·48	0·00	0·3	0·00	0·0	0·61	0·8

TABLE No. 5·12—*Contd.*

1	2	3	4	5	6	7	8	9	10	11
Rajasthan	P .	461·32	0·00	3·48	0·00	0·00	0·00	0·0	0·00	0·1
	NP .	975·76	0·00	0·55	0·00	0·0	0·00	0·0	0·00	0·9
	TOTAL	1437·08	0·00	0·55	0·00	0·0	0·00	0·0	0·00	0·4
U. Pradesh	P .	386·04	0·00	0·39	0·00	0·0	0·00	0·0	0·00	0·4
	NP .	992·23	0·00	9·33	0·00	0·2	0·00	0·0	0·00	0·8
	TOTAL	1378·27	0·00	6·83	0·00	0·2	0·00	0·0	0·00	0·8
West Bengal . . .	P .	257·37	0·00	0·19	0·00	0·1	0·00	0·0	0·00	0·1
	NP .	265·35	1·51	0·98	1·07	0·6	0·00	0·0	1·34	0·5
	TOTAL	522·72	0·77	0·59	1·07	0·4	0·00	0·0	1·34	0·3
H. Pradesh . . .	P .	N.R.	..	..	..	..	..	..	..	..
	NP .	332·13	0·00	0·00	0·00	0·0	0·00	0·0	0·00	0·0
	TOTAL	332·13	0·00	0·00	0·00	0·0	0·00	0·0	0·00	0·0
All States	P .	5130·53	9·46	9·55	3·14	3·3	0·00	0·7	3·22	1·9
	NP .	9062·38	3·67	4·92	2·15	1·2	0·80	3·1	2·77	1·1
	TOTAL	14192·91	5·76	6·59	2·72	1·9	0·80	2·4	3·02	1·4

TABLE No. 5·13

Percentage distribution of Respondents of various size-groups of cultivation holding doing seed treatment—crop-wise

Size-group	Package/ Non-package	Paddy				Wheat				Groundnut			
		Percentage doing seed treatment	Year of first adoption			Percentage doing seed treatment	Year of first adoption			Percentage doing seed treatment	Year of first adoption		
			I year before 1955-56	II year 1955-56 to 1960-61	III year 1961-62		I year before 1955-56	II year 1955-56 to 1960-61	III year 1961-62		I year before 1955-56	II year 1955-56 to 1960-61	III year 1960-61
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Upto 1·006	P	16·53	2·98	1·90	11·65	56·52	..	..	56·52	15·52	..	..	15·52
	NP	23·95	0·57	0·19	21·10	6·67	..	3·33	33·30	25·00	1·88	1·25	21·88
	TOTAL	20·89	1·56	0·89	17·21	28·30	..	1·89	26·42	22·48	1·38	0·91	20·18
1·01 to 4·036	P	15·41	3·15	3·15	9·11	39·34	..	6·56	31·15	22·67	5·81	5·81	11·05
	NP	18·29	0·44	0·87	15·53	24·70	2·41	11·45	10·84	32·25	0·70	8·58	21·58
	TOTAL	16·98	1·67	1·90	12·46	28·63	1·76	10·13	16·30	29·52	2·16	7·79	18·57
4·04 to 8·086	P	19·05	10·32	4·76	3·97	31·03	..	6·90	24·14	31·82	3·41	15·91	12·50
	NP	15·70	0·58	..	13·37	29·81	1·86	18·01	9·94	31·15	1·64	18·03	10·93
	TOTAL	17·11	4·70	2·01	9·40	30·00	1·58	16·32	12·11	31·37	2·21	17·34	11·44
8·09 to 20·226	P	19·44	2·78	11·11	5·56	73·08	..	..	69·23	66·07	7·14	2·14	37·50
	NP	20·45	..	2·27	18·18	41·91	3·79	18·18	18·94	23·08	3·85	12·50	6·73
	TOTAL	20·00	1·25	6·25	12·50	46·20	3·16	15·19	27·22	38·13	5·0	15·63	17·50
20·23 to & above	P	50·00	50·00	..	..	87·50	..	..	87·50	77·8	..	..	77·8
	NP	13·33	..	6·67	6·67	51·72	3·45	37·93	10·34	18·75	6·25	6·25	6·25
	TOTAL	17·65	5·88	5·88	5·88	59·46	2·70	29·73	27·03	40·0	4·0	4·0	32·0
All size group	P	16·39	3·99	3·17	9·24	48·98	..	4·08	43·54	31·33	4·44	9·92	17·49
	NP	20·05	0·48	0·62	17·29	30·89	2·51	16·22	12·16	29·42	1·57	9·62	17·45
	TOTAL	18·47	2·00	1·73	13·80	34·89	1·95	13·53	19·10	28·99	2·43	9·55	17·46

TABLE NO. 5·13.—(*contd.*)

Size group	Package/Non-Package	Jowar				All Crops			
		Total No of doing seed treatment	Year of first adoption			Total no of doing seed treatment	Year of first adoption		
			I year before 1955-56	II year 1955-56 to 1960-61	III year 1961-62		I year before 1955-56	II year 1955-56 to 1960-61	III year 1961-62
1	2	15	16	17	18	19	20	21	22
Upto 1·006	P	60·00	—	—	60·00	18·62	2·53	1·61	14·48
	NP	20·69	—	—	20·69	25·46	0·86	1·43	20·74
	TOTAL	26··48	—	—	26·48	22·84	1·50	1·50	18·34
1·01 to 4·036	P	30·00	7·50	2·50	20·00	23·42	4·45	4·60	14·08
	NP	3·33	—	1·11	22·2	27·82	1·29	5·84	19·80
	TOTAL	11·54	2·31	1·54	7·69..	26·03	2·58	5·33	17·47
4·04 to 8·086	P	21·42	7·14	7·14	7·14	32·26	8·60	12·37	11·29
	NP	—	—	—	—	31·99	2·31	14·70	14·12
	TOTAL	3·27	1·09	1·09	1·09	13·32	4·50	13·88	13·13
8·09 to 20·226	P	53·33	20·0	26·67	—	63·95	9·30	18·60	34·88
	NP	2·24	1·37	—	1·37	40·44	4·37	16·39	19·67
	TOTAL	11·36	4·55	4·55	1·14	47·95	5·95	17·10	5·34
28·23 & above	P	—	—	—	—	81·81	9·09	—	72·73
	NP	—	—	—	—	54·28	5·71	37·14	11·43
	TOTAL	—	—	—	—	60·87	6·52	28·26	26·09
All size group	P	35·14	9·46	8·11	16·22	26·03	4·74	5·52	15·56
	NP	3·94	0·36	0·36	3·23	29·16	5·58	24·59	65·46
	TOTAL	10·48	2·27	1·98	5·95	27·96	2·82	6·53	17·73

TABLE No. 5·14

Percentage distribution of respondents adopting the seed treatment by type of treatment at first adoption—cropwise.

Crop	Package and Non-Package	Percent of adopting cultivators taking measures			
		Type I	Type II	Type III	Type IV
1	2	3	4	5	6
Paddy	Package	30·20	57·81	10·41	1·56
	Non-package	94·73	3·38	—	1·88
	TOTAL	67·68	26·20	4·37	1·75
Jowar	Package	2·86	27·14	—	68·57
	Non-package	3·75	73·75	0·63	21·87
	TOTAL	3·48	59·56	0·43	36·08
Wheat	Package	23·33	35·00	—	40·83
	Non-package	32·34	46·09	—	21·56
	TOTAL	29·56	42·67	—	27·50
Groundnut	Package	40·00	60·00	—	—
	Non-package	72·72	27·27	—	—
	TOTAL	50·00	50·00	—	—
All crops	Package	23·83	46·89	5·18	23·31
	Non-package	48·25	50·58	0·49	17·30
	TOTAL	38·72	49·16	2·35	19·68

TABLE NO. 5·15

Percentage distribution (gross) of respondents by reasons for not doing seed treatment—Crop-wise.

Crop	Reasons for not doing seed treatment.							
	No knowledge	Knowledge but no supply of chemicals and equipments.	No advice as to how measures are to be taken	Seed taken from other cultivators	Seed taken from coop. which treat the seed & treated seed recd. from Deptt. Store	Others did not take it	Not convinced of the treatment	Others
1	2	3	4	5	6	7	8	9
Paddy								
Package	74·84	0·86	2·38	0·43	0·22	11·12	6·70	9·07
Non-package	82·54	0·26	6·40	1·21	0·35	1·04	4·06	5·79
TOTAL	79·12	0·53	4·61	0·86	0·28	5·52	5·23	7·25
Jowar								
Package	81·33	—	2·67	1·33	1·33	10·67	—	16·00
Non-package	80·45	0·84	6·42	3·07	0·28	1·68	1·68	17·88
TOTAL	66·74	0·69	5·77	2·77	0·46	3·23	1·39	17·55
Wheat								
Package	53.96	7·17	1·13	1·13	2·64	18·49	14·77	14·72
Non-package	69·78	3·01	3·48	6·80	2·85	0·95	5·22	9·49
TOTAL	65·10	4·24	2·79	5·13	2·79	6·13	4·79	11·04
Groundnu								
Package	79·17	2·08	2·08	2·08	—	35·42	2·08	16·67
Non-package	83·95	—	6·72	1·12	—	4·48	1·49	2·61
TOTAL	83·23	0·32	6·01	1·27	—	9·18	1·58	4·75
All crops								
Package	69·04	1·80	2·38	1·06	*0·90	9·50	6·80	17·97
Non-Package	81·78	1·35	7·30	3·93	2·69	1·55	4·14	12·32
TOTAL	76·85	1·52	5·39	2·82	2·00	4·63	5·17	14·43

TABLE NO. 5·15(A

Percentage Distribution (Gross) of Respondents not doing seed treatment reasons for not taking the measures according to Size Group of cultivation Holding.

Size/Group in hectares	Package and non-package	No know-ledge (Code 1)	Know-ledge but no supply of chemi-cals and equip-ment (Code 2)	No advice as to how measures are to be taken (Code 3)	Seed taken from other cultiva-tors (Code 4)	Seed taken from co-op. which treats the seed & treated seed received from Depart-mental store (Code 5 & 6)	Others did not take it. (code 8)	Sentimen-tal & religious objection (Code 12)	Supply linked with other materials (Code 16)	Others
1	2	3	4	5	6	7	8	9	10	11
Upto 0·196	P .	0	0	0	0	0	0	0	0	0
	NP .	100·00	0	0	0	0	0	0	0	0
	TOTAL .	100·00	0	0	0	0	0	0	0	0
0·20 to 0·396	P .	76·00	2·0	0	0	0	8·0	0	8·0	2·0
	NP .	85·05	0	3·74	0	0	1·87	0	7·48	0·93
	TOTAL .	82·17	0·14	2·55	0	0	3·82	0	7·64	1·27
0·40 to 1·006	P .	78·55	0·95	2·84	0·95	0·63	6·31	5·99	9·46	1·89
	NP .	84·94	0·45	5·39	5·62	0·67	0·22	4·49	8·76	1·12
	TOTAL .	82·28	0·66	4·33	3·67	0·66	2·76	5·12	9·05	1·44

TABLE NO. 5·15 (A)—*Contd.*

1	2	3	4	5	6	7	8	9	10	11
1·01 to 2·016	P	77·37	1·22	2·14	0·61	0	8·26	5·50	12·23	1·22
	NP	85·55	1·13	9·48	6·77	1·35	1·13	3·39	8·80	0
	TOTAL	82·08	1·17	6·36	4·16	0·78	4·16	4·29	10·26	0·52
2·02 to 3·026	P	67·86	1·79	2·38	1·19	1·19	8·33	7·74	19·64	0·60
	NP	79·67	0·41	9·76	4·07	4·07	0·81	4·47	10·57	0·41
	TOTAL	74·88	0·97	6·76	2·90	2·90	3·86	5·80	14·25	0·48
3·03 to 4·036	P	68·75	2·68	3·57	0·89	0	15·18	4·46	16·07	0
	NP	80·49	2·44	6·10	1·22	3·66	2·44	4·27	13·41	2·44
	TOTAL	75·72	2·54	5·07	1·09	2·17	7·61	4·35	14·49	1·45
4·04 to 5·056	P	60·00	1·25	2·50	1·25	1·25	16·25	11·25	21·25	1·25
	NP	74·11	1·79	4·46	1·79	4·46	4·46	6·25	20·54	0·89
	TOTAL	68·23	1·56	3·65	1·56	3·12	9·37	8.33	20·83	1·04
5·06 to 6·066	P	51·35	2·70	2·70	5·41	0	16·22	18·92	32·43	0
	NP	75·58	0	6·98	3·49	5·81	1·16	3·49	17·44	0
	TOTAL	68·29	0·81	5·69	4·07	4·07	5·69	8·13	21·95	0
6. 07 to 8·086	P	44·68	8·51	0	2·13	0	12·77	10·64	25·53	0
	NP	83·74	2·44	6·50	0·81	3·25	2·44	4·07	17·07	0·81
	TOTAL	72·94	4·12	4·71	1·18	2·35	5·29	5·88	19·41	0·59
8·09 to 10·106	P	36·36	3·03	0	0	3·03	12·12	6·06	42·42	0
	NP	63·46	3·85	9·62	1·92	7·69	0	3·85	25·0	0
	TOTAL	52·94	3·53	5·88	1·18	5·88	4·71	4·71	31·77	0

TABLE NO. 5·15(A)—*contd.*

1	2	3	4	5	6	7	8	9	10	11
10·11 to 12·126 . . .	P .	42·86	4·76	4·76	0	0	19·05	14·29	28·57	0
	N.P .	81·58	7·89	2·63	2·63	7·89	7·89	2·63	10·54	5·26
	TOTAL	67·80	6·78	3·39	1·69	5·08	11·86	6·78	16·95	3·39
12·13 to 20·226	P .	5·26	0	5·26	5·26	21·05	5·26	5·26	52·63	5·24
	N.P .	76·25	5·0	10·0	1·25	6·25	2·50	6·25	8·75	2·5
	TOTAL	62·63	4·04	9·09	2·02	9·09	3·03	6·06	17·17	3·03
20·23 and above . . .	P .	20·0	0	0	0	10·0	0	10·0	70·0	0
	N.P .	75·0	0	12·50	0	3·13	6·25	12·50	12·50	0
	TOTAL .	61·90	0	9·52	0	4·76	4·76	11·90	26·19	0
ALL SIZE GROUP . .	P .	69·04	1·80	2·38	1·06	0·90	9·50	6·80	16·63	1·15
	N.P .	81·78	1·35	7·30	3·93	2·69	1·55	4·14	11·44	0·88
	TOTAL .	76·85	1·52	5·39	2·82	2·0	4·63	5·17	13·45	0·98

TABLE NO. 5·16

Distribution of respondents in each size group of cultivation holding taking rat control measures.

Size group (In Hectare)	Total No. of respondents	No. reporting rat measure in their field % for Col. 2	No. taking the rat control measures	% of Col. 4 over Col. 3	Of those Col. 4 No. & proportion of respondents taking the rat control measures for the first time in different years			
					Before 1955-56		1955-56	
					No.	% to Col. 4	No.	% to Col. 4
1	2	3	4	5	6	7	8	9
Package								
Upto 1·006	464	221	127	57·5	87		14	
1·01 to 4·036	701	380	175	46·1	100		24	
4·04 to 8·086	187	113	54	47·8	17		14	
8·09 to 20·226	86	58	25	43·1	6		0	
20·23 and above	12	7	1	14·3	0		0	
TOTAL	1,450	779 (53·2)	382	49·0	210	55·0	52	13·6
Non-package								
Upto 1·006	708	403	104	25·5	49		2	
1·01 to 4·036	1,016	631	155	24·6	67		3	
4·04 to 8·086	348	229	76	33·2	28		5	
8·09 to 20·226	183	114	35	30·7	18		1	
20·23 and above	35	16	6	37·5	3		1	
TOTAL	2,290	1398 (61·1)	376	26·9	165	43·9	12	3·2
All States-								
Upto 1·006	1,172	629	231	36·7	136		16	
1·01 to 4·036	1,717	1,011	330	32·6	167		27	
4·04 to 8·086	535	342	130	38·0	45		19	
8·09 to 20·226	269	172	60	34·9	24		1	
20·23 and above	47	23	7	30·4	3		2	
TOTAL	3,740	2,177 (58·2)	758	34·8	375	49·5	65	8·6

TABLE No. 5·16—*Contd.*

Size Group (In Hectares)	Of those Col. 4 no. and proportion of respondents taking the rat control measures for the first time in different years.											
	1956-57		1957-58		1958-59		1959-60		1960-61		1961-62	
	No.	% to Col. 4	No.	% to Col. 4	No.	% to Col. 4	No.	% to Col. 4	No.	% to Col. 4	No.	% to Col. 4
1	10	11	12	13	14	15	16	17	18	19	20	21
Package												
Upto 1·006	2		3		6		4		7		4	
1·01 to 4·036	0		1		6		7		7		29	
4·042 to 8·086	0		1		1		5		4		12	
8·09 to 20·226	1		1		4		3		5		4	
20·23 & above	0		0		0		0		0		0	
TOTAL	3	0·8	6	1·6	17	4·5	19	4·9	23	6·1	49	12·8
NON-PACKAGE												
Upto 1·006	1		1		6		11		10		20	
1·01 to 4·036	1		5		11		14		13		34	
4·042 to 8·086	0		0		10		11		11		9	
8·09 to 20·226	0		1		3		3		4		5	
20·23 & above	0		1		0		1		0		0	
TOTAL	2	0·5	8	2·1	30	8·0	40	10·6	38	10·1	68	18·1
ALL STATES												
Upto 1·006	3		4		12		15		17		24	
1·01 to 4·036	1		6		17		21		20		63	
4·042 to 8·086	0		1		11		16		15		21	
8·09 to 20·226	1		2		7		6		9		9	
20·23 & above	0		1		0		1		0		0	
TOTAL	5	0·6	14	1·8	47	6·2	59	7·8	61	8·1	117	15·4

TABLE NO. 5·17

Distribution of respondents taking rat Control measures by types of measures taken and timely or not.

State	Package and Non-package	Total No. of respondents	No. taking rat control measures	No. taking timely measures	No. taking the measures every year	Type of measures taken in 1961-62	
						Chemical	Mechanical
1	2	3	4	5	6	7	8
Andhra Pradesh	Package	100	90	90	90	24	76
	Non-package	200	12	10	7	8	4
	TOTAL	300	102	100	97	32	80
Assam	Package	100	0	0	0	0	0
	Non-package	100	1	0	0	0	0
	TOTAL	200	1	0	0	0	0
Bihar	Package	100	0	0	0	0	0
	Non-package	100	0	0	0	0	0
	TOTAL	200	0	0	0	0	0
Gujarat	Package	100	0	0	0	0	0
	Non-package	100	0	0	0	0	0
	TOTAL	200	0	0	0	0	0
Jammu & Kashmir	Package	50	38	38	37	4	34
	Non-package	0	0	0	0	0	0
	TOTAL	50	38	38	37	4	34

TABLE No. 5·17—*contd.*

1	2	3	4	5	6	7	8
Kerala	Package	100	66	66	65	58	10
	Non-package	100	59	57	56	51	15
	TOTAL	200	125	123	121	109	25
Madhya Pradesh	Package	100	0	0	0	0	0
	Non-package	300	65	59	59	64	1
	TOTAL	400	65	59	59	64	1
Madras	Package	100	97	96	96	3	96
	Non-package	100	74	72	63	11	63
	TOTAL	200	171	168	159	14	156
Maharashtra	Package	100	0	0	0	0	0
	Non-package	200	4	3	1	3	1
	TOTAL	300	4	3	1	3	1
Mysore	Package	100	22	22	20	15	15
	Non-package	200	2	2	2	1	1
	TOTAL	300	24	24	22	16	16
Orissa	Package	100	0	0	0	0	0
	Non-package	100	8	7	3	0	8
	TOTAL	200	8	7	3	0	8
Punjab	Package	100	67	59	41	67	0
	Non-package	100	44	44	40	44	0
	TOTAL	200	111	103	81	111	0

TABLE No. 5·17—*Contd.*

1	2	3	4	5	6	7	8
Rajasthan . .	Package	100	0	0	0	0	0
	Non-package . . .	200	51	51	44	51	0
	TOTAL . .	300	51	51	44	51	0
Uttar Pradesh .	Package	100	1	1	1	1	0
	Non-package . . .	300	42	42	11	40	2
	TOTAL . .	400	43	43	12	41	2
West Bengal . .	Package	100	0	1	0	0	0
	Non-package . . .	90	0	0	0	0	0
	TOTAL . .	190	0	1	0	0	0
Himachal Pradesh .	Package	0	0	0	0	0	
	Non-package . . .	100	14	13	1	10	1
	TOTAL . .	100	14	13	1	10	1
ALL INDIA . .	Package	1,450	382	372	350	172	231
	Non-package . . .	2,290	376	360	291	283	96
	TOTAL . .	3,740	758	732	641	455	327

TABLE NO. 5·18

Distribution of respondents not adopting rat control measures by reasons for non-adoption.

State	Package & Non-package	Total No. of respon-dents	Not taking rat control mea-sures	No know-ledge	No sup-plies	No advise	No coope-ration from others	Not con-vinced	Not avail-able in easy reach	Harm-ful to crops	Linked sup-plies	Others
1	2	3	4	5	6	7	8	9	10	11	12	13
Andhra Pradesh	P	100	8	0	0	0	0	0	0	8	0	0
	NP	200	41	14	1	1	1	1	1	4	8	3
	TOTAL	300	49	14	1	1	1	1	1	12	8	3
Assam	P	100	0	0	0	0	0	0	0	0	0	0
	NP	100	34	32	0	4	6	0	0	0	0	0
	TOTAL	200	34	32	0	4	6	0	0	0	0	0
Bihar	P	100	27	14	10	1	2	0	0	0	0	0
	NP	100	50	2	0	1	15	0	20	0	10	1
	TOTAL	200	77	16	10	2	17	0	20	0	10	1
Gujarat	P	100	32	28	0	0	27	0	0	1	0	0
	NP	100	75	12	0	9	33	1	0	70	0	0
	TOTAL	200	107	40	0	9	60	1	0	71	0	0
Jammu & Kashmir	P	50	7	3	2	0	0	0	0	0	0	0
	NP	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	50	7	3	2	0	0	0	0	0	0	0

TABLE No. 5·18—*contd.*

1	2	3	4	5	6	7	8	9	10	11	12	13
Kerala	P	100	2	0	0	0	0	0	0	0	0	0
	NP	100	22	1	0	0	0	1	1	4	3	3
	TOTAL	200	24	1	0	0	0	1	1	4	3	3
Madhya Pradesh	P	100	0	0	0	0	0	0	0	0	0	0
	NP	300	126	53	19	8	7	0	10	17	6	7
	TOTAL	400	126	53	19	8	7	0	10	17	6	7
Madras	P	100	0	0	0	0	0	0	0	0	0	0
	NP	100	10	0	0	0	0	1	0	1	2	0
	TOTAL	200	10	0	0	0	0	1	0	1	2	0
Maharashtra	P	100	28	28	0	0	0	0	0	0	0	0
	NP	200	105	97	0	0	0	1	1	2	3	0
	TOTAL	300	133	125	0	0	0	1	1	2	3	0
Mysore	P	100	70	18	0	3	14	0	0	0	24	0
	NP	200	35	1	0	4	4	0	3	2	14	1
	TOTAL	300	105	19	0	7	18	0	3	2	38	1
Orissa	P	100	0	0	0	0	0	0	0	0	0	0
	NP	100	31	7	0	3	0	2	5	8	3	0
	TOTAL	200	31	7	0	3	0	2	5	8	3	0
Punjab	P	100	32	1	2	3	0	2	1	5	1	8
	NP	100	41	31	0	0	0	1	0	3	2	0
	TOTAL	200	73	32	2	3	0	3	1	8	3	8

TABLE No. 5·1 8—*Contd.*

2		3	4	5	6	7	8	9	10	11	12	13
Rajasthan	P	100	51	9	1	2	0	0	0	15	5	10
	NP	200	93	51	1	1	0	0	0	16	0	0
	TOTAL	300	144	60	2	3	0	0	0	31	5	10
Uttar Pradesh	P	100	73	68	0	0	0	0	1	2	0	0
	NP	300	203	122	13	76	44	23	0	40	3	0
	TOTAL	400	276	190	13	76	44	23	1	42	3	0
West Bengal	P	100	78	43	0	0	0	1	1	0	5	0
	NP	90	76	74	0	0	0	0	0	0	0	0
	TOTAL	190	154	117	0	0	0	1	1	0	5	0
Himachal Pradesh	P	0	0	0	0	0	0	0	0	0	0	0
	NP	100	80	3	17	0	4	0	4	2	35	0
	TOTAL	100	80	3	17	0	4	0	4	2	35	0
ALL INDIA	P	1,450	408	212	15	9	43	3	3	31	35	18
	NP	2,290	1,022	500	51	107	114	31	45	169	89	15
	TOTAL	3,740	1,430	712	66	116	157	34	48	200	124	33

PROGRAMME EVALUATION ORGANISATION

(Planning Commission)

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